Professional denture service

George Wood Clapp, Russell Wilford Tench

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DEDICATION

To all who seek to place denture service on its proper plane in the esteem of the profession and the public, this work is respectfully dedicated.

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PROFESSIONAL DENTURE SERVICE

BY
GEORGE WOOD CLAPP, D.D.S.
and
RUSSELL WILFORD TENCH, D.D.S.

WITH AN INTRODUCTION BY
J. LEON WILLIAMS, D.D.S., F.R.A.S.

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CREDITS

No claims are made for originality in fundamentals.

We have gladly taken the best we have been able to find in every line from everyone, have added to it where possible and have harmonized all into a consecutive procedure.

To all to whom we are indebted we give hearty thanks in this way rather than cumber and confuse the text with many names of originators of special technic.

The Authors.

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THE PURPOSE OF THIS BOOK

is to present every important step in the technic of fitting an edentulous patient with really professional dentures.

Professional dentures are distinguished by being stable in all positions of the mouth, comfortable in use, efficient in mastication and natural in appearance.

The technic employed is that taught in the Laboratory of the Research Division of The Dentists' Supply Company. It is being used with great satisfaction by dentists in all parts of the United States.

The taking of impressions with compound, the use of Williams' methods of selection and Gysi's methods of articulation are taught because the writers believe them to be sufficiently superior to other methods to much more than justify the trouble incident to their mastery.

Most of the illustrations are original.

The imperative method has been adopted in the text because it is the natural method in teaching, because it facilitates the mastery of the subject by the student, and because it permits the use of fewer words.

As far as possible scientific explanation has been omitted because the science has been incorporated in its practice.

The Authors.

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TABLE OF CONTENTS

PAGE

Introduction by J. Leon Williams, D.D.S., F.R.A.S. 9

PART I

Impressions and Bites 13

PART II

Selecting the Size, Form and Shade in Artificial Teeth 97

PART III

Measuring Habitual Masticating Movements..... 124

PART IV

Arranging the Teeth 183

PART V

Simplex Articulator and Snow Face Bow..... 211

PART VI

Flasking, Vulcanizing, Finishing and Perfecting the Fit 225

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INTRODUCTION

A CALL TO SERVICE

One of the great merchant princes of America recently said, "The secret of my success is largely that my business is founded on the principle that service shall have first consideration. Give the public the best possible service and the money returns are certain to follow."

This idea of "service first" is a comparatively new note in the commercial world. It is a sound financial proposition, and, so far as it is sincerely carried out, represents a great advance in business morality.

It is sound financially because the wealth of the world is constantly increasing, and, consequently, the standards of everything required in life are always rising. Those who keep abreast of these rising standards, who by superior service build up a reputation for supplying something better than the average, will always command first attention from those who want this superior service and have the money to pay for it.

When I decided, nearly a dozen years ago, that I would devote the remaining years of my life to an effort to raise the standard of prosthetic dentistry, I saw clearly that three fundamental things were necessary. The first and most important thing was improved forms of artificial teeth; the second requisite was an improved technic in all the processes of the art of making artificial dentures; and the third thing that must be constantly insisted on was an adequate fee to the dentist for greatly improved service.

Improved service, the best possible service first, and then the demand for a fee commensurate with that service. I have said that this must be *constantly insisted on,* and there was a special reason for this, in fact two reasons. The great majority of dentists have always undervalued

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their services in this branch of practice. They have not adequately estimated the value of good denture service to their patients and gradually came to relegate as much of the detail of this service as possible to inferior hands. Naturally the public came to place on the value of denture service the low estimate that corresponded with the dentist's own estimate. To change all this it was therefore necessary not only to give the dentist materials and methods for a higher form of service but also to encourage him in the effort to educate his patients up to a full appreciation of the value of the improved service.

Almost at the outset of this enterprise I insisted that if the dentist would overcome his long cultivated timidity in this matter of fees he would have but little difficulty in this direction. Americans, especially, I felt certain, would be found as willing to pay for value received in denture service as in other less important things.

During the four years that Trubyte teeth have been in the hands of dentists, the results achieved by those who have adopted their use, in connection with the greatly improved technic that has been introduced simultaneously, have fully justified the highest anticipations on the part of those responsible for the introduction of the higher standards of service. Thousands of dentists who have adopted these new methods and higher standards have found such appreciation of their efforts and success on the part of their patients that they have had no difficulty in securing a very substantial advance in fees.

And this experience is illustrated and confirmed by numberless instances in the history of human progress. QUALITY OF SERVICE FIRST, then make the value of this service clearly seen by the public and the financial rewards are sure to follow.

One of the greatest weaknesses of human nature, and the one which most seriously interferes with success in life, is lack of faith in oneself and in others. Whatsoever a man thinketh, that he is and that can he do, and

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in the matter of real achievement the world will, generally speaking, take him at his own estimate.

A man's occupation or calling fills the larger part of his life and he should therefore get one of the greatest compensations of life out of his calling. And this greatest compensation must be found in the consciousness that he is rendering the best service that he can to his fellows.

Nothing is more degrading to all the standards of life and the whole moral nature of a man than the ever-present consciousness that he is not doing his best. That way lies the darkest aspect of failure.

Foremost among the works which The Dentists' Supply Company has issued with the purpose of assisting dentists in the improvement of their technic in denture service must be placed this little book.

The authors freely acknowledge that they have gleaned many of the ideas and methods from many sources but I think it is not claiming too much to say that they have added some things of importance out of their own experience and have so simplified, co-ordinated and illustrated every step in the newer methods of denture making as to produce the most valuable work on this subject that has appeared.

Not a single procedure has been described that has not been successfully tested and practically applied.

I often heard the late Dr. W. H. Atkinson say that if the bulky dental text books could be shorn of all their useless trimmings and superfluous verbiage and so reduced to about one-fourth of the usual size their usefulness would be more than doubled.

This production seems to me to fulfill my old friend's conception of the ideal text book. May it be to those to whom they have dedicated it an inspiration to establish this necessary and difficult form of dental service on a plane which commands the respect and even the admiration of those who serve and those who are served.

J. LEON WILLIAMS.

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The Plan of the Book

The several steps, from the examination of the mouth preceding the taking of the impression to the discharge of the patient, are described, as nearly as possible, in the order in which they are performed. We hope that dentists who desire to follow this technic may be able to open the book before them and perform the steps in correct order, as they find them illustrated and described. This separates parts of the technic which would otherwise be described together, but will, we hope, be helpful to students.

Modelling compound impressions are here accepted as standard because we believe them to be superior, in practically all cases, to other impressions. We believe that any dentist who will devote to the mastery of compound technic the same attention that he must give to mastering the principles of inlay making, for instance, can achieve a gratifying degree of success.

Dentists who prefer to use plaster in connection with compound, will find directions for doing so on pages 95 and 96.

The technic of using the Gysi Adaptable Articulator is explained in detail, because an understanding of its principles is important to every dentist who wishes to render professional denture service, and certain portions of it may advantageously be used in connection with the Simplex Articulator.

At the date of this writing, it is impossible to obtain Adaptable Articulators from Switzerland, but it is hoped that before long they can be produced in this country, so that they may be placed within the reach of all.

The Simplex Articulator, when used with proper technic is very satisfactory indeed. The most desirable technic for this articulator is illustrated and described beginning on page 211.

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ERRATA

Owing to unusual conditions during preparation, certain errors in figure numbers and technical terms have occurred, as follows. If the reader will make the corrections on the pages indicated, annoyance will be avoided.

Page 39, line 13, "D" should be "A".

Page 43, line 6, should read "Figure 22" instead of "Figure 20".

Page 73, line 7, "right hand" should read "left hand".

Page 90, fourth line from bottom of page, "Figure 30" should read "Figure 31".

Page 126, line 18, "Figure 124" should read "Figure 123".

Page 147, line 10, "127" should read "126".

Page 180, line 9, "Figure 150" should read "Figure 145".

Page 192, line 4. The sentence beginning "Only the mesio-buccal cusp" etc., should read: "Only the mesio-lingual cusp of this tooth should touch the occlusal surface of the opposing bite, the disto-lingual cusp being slightly raised and the buccal cusps being raised about three-quarters of a millimeter out of contact, as shown in the second diagram of "A", Figure 164".

Page 194, line 9. The sentence beginning "The movement" etc., should read "The movement of the teeth on the working side, back to a position of rest is nearly at right angles to the median line".

Page 210, line 7. "(b)" refers to solid line "A-B". "a" refers to upper dotted line.

Page 213, last line. "137" should read "89".

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PART I

IMPRESSIONS AND BITES

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Merits of Compound Impressions.

Compound, properly handled, is less objectionable to patients than plaster.

The impressions can be taken in stages and the adaptation of both plates proved before they are made.

The guesswork and uncertainty as to the height and form of the impression margins common to other methods of impression taking are avoided, and the contour and height of the flanges accurately determined by the actions of the muscles upon the impression material.

To be successful in mastication, a denture must compress the soft tissues as described later so that they oppose to the thrust of mastication the same resistance as the hard tissue. Only compound impressions permit proper compression of the soft tissues.

In mouths presenting a relatively large proportion of soft tissue, the correct use of compound insures a greater degree of success than is otherwise obtainable.

A better degree of success can be achieved in taking lower impressions than we believe to be otherwise possible.

The finishing of the impression under biting stress is very important. It is possible only when compound is used.

The use of compound facilitates the taking of impressions and bites and records of jaw movements at one sitting. The most exact bite relations are obtained and the bites make the most satisfactory bases for taking accurate records of jaw movements.

The fact that a patient is satisfied with dentures is no indication that they are the best obtainable. Many previously satisfied patients have been astonished and delighted with dentures made by the technic described herein. It requires more time and more attention to detail than the impression taking methods in general use, but so much time is saved in the later stages of the work, and there are so few make-overs and the results are so much better as to make it really economical.

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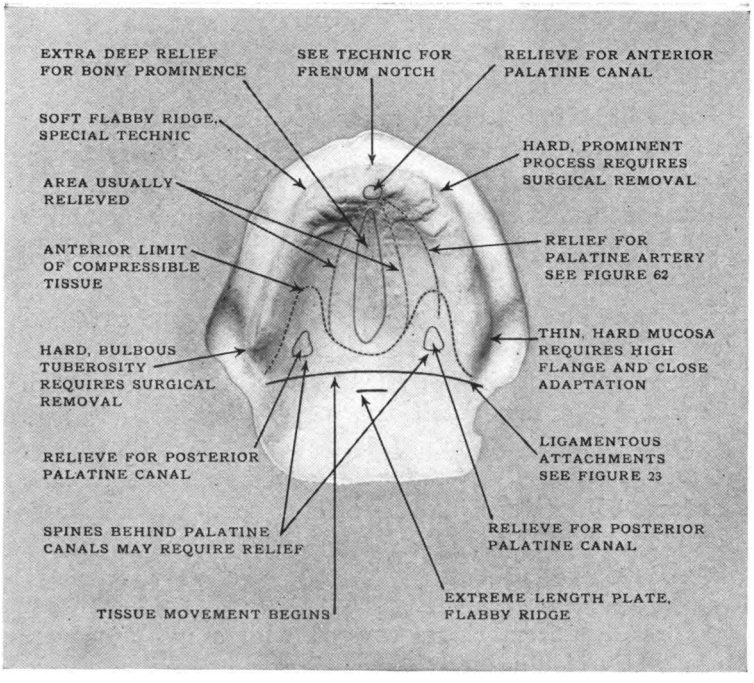

Fig. 1

This illustration summarizes many of the conditions in the mouth which affect the procedure of impression taking, and serves to emphasize certain steps in technic. It is placed here so that when the technic of impression taking is understood, it may serve as an easily accessible reminder of certain important details.

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Classification of Tissue Conditions in Edentulous Mouths.

It will be found useful to classify the conditions of the tissues in edentulous mouths as a means of determining the procedure most likely to yield satisfactory results. Mr. Supplee's classification, which follows, will be found a valuable aid in the selection of an impression material, in teaching and in the interchange of thought among workers.

It also helps to understand why dentists who have successfully made dentures from plaster impressions cannot succeed for the same patient 4 or 5 years later, although they use the same materials and technic. Mouths in Classes 1 and 2 tend to pass into the conditions in Classes 3 and 4, especially if the artificial dentures are not well articulated, or when the patient is compelled to masticate on the incisors.

UPPERS.

Class 1. Firm ridges covered with a uniform layer of slightly yielding membrane. Buccal and labial attachments connected high on border of ridge.

If plaster impressions are to be satisfactory anywhere, it will be in this Class and Class 2. Muscle trimmed plaster impressions may be made by the technic described on pages 95 and 96.

Class 2. Firm ridges and vault covered with tensely drawn membrane. Very small area of soft tissue over the rear third of the hard palate on either side of the median line. Buccal and labial attachments connected close to the crest of the ridge and very definite in movement.

Class 3. Firm ridges. Soft area in the vault, particularly over the rear third of the hard palate on either side of the median line. The buccal and labial attachments are connected to the ridge areas of movable soft tissue overlying the buccal and labial surfaces.

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Small bony prominences are often hidden under the soft membrane and cannot be detected and properly located without pressure by a ball-end instrument.

Successful dentures for mouths in Classes 3 and 4 are almost impossible when plaster is used for impressions because localized compression of the soft tissues is essential. They require the use of compound and the technic described in the following pages.

Class 4. High or low vault. Soft ridges or tuberosities. Buccal and labial attachments either high or low. Vault either hard or varying in density.

LOWERS.

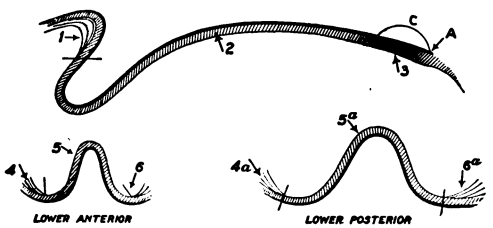
Class 1. The prominent ridge that is hard all over.

Class 2. The flat, hard ridge with prominent muscles whose bases of attachment are at least ¼ inch from the crest of the ridge in the molar region.

Class 3. The flat or high ridge where the muscular attachments are movable to the crest of the ridge, particularly in the molar region. (In many cases this type has indirect attachment to the top of the ridge through areas of movable soft tissue.)

Class 4. The flexible or soft ridge. Muscular attachments either direct or indirect through soft tissue.

CLASS 1.
(SUPPLEE)



EXPLANATION OF MARKS — UPPER.

1. Muscular attachments connected high on labial border of ridge.
2. Vault covered with a uniform layer of membrane.
3. Slight soft areas in rear third of vault.

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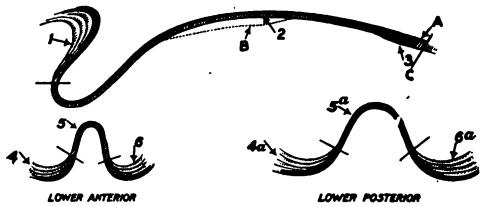
EXPLANATION OF MARKS — LOWER.

4-6. Muscular attachments connected low on labial and lingual border of the ridge.

5. Uniform layer of membrane over a prominent ridge.

4a-5a-6a. Same condition in molar region.

CLASS 2.
(SUPPLEE)



EXPLANATION OF MARKS — UPPER.

1. Muscular attachments of labial border connected near the crest of ridge.

2. Vault covered with thin, tensely drawn membrane.

3. Bony prominence often present in this class of case.

4. Small area of soft membrane in rear third vault.

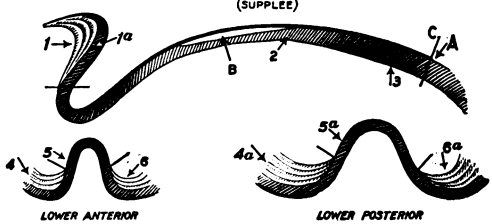
EXPLANATION OF MARKS — LOWER.

4-6. Labial and lingual attachments connected close to crest of ridge.

4a-6a. Same condition in molar region.

5-5a. Thin tense membrane covering ridge.

CLASS 3
(SUPPLEE)



EXPLANATION OF MARKS — UPPER.

1. Muscular attachment connected to ridge through areas of soft tissue (1a).

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2. Comparatively deep area of soft membrane covering the vault.

B. A small pronounced bony prominence is often hidden under the soft membrane, that cannot be detected without pressure.

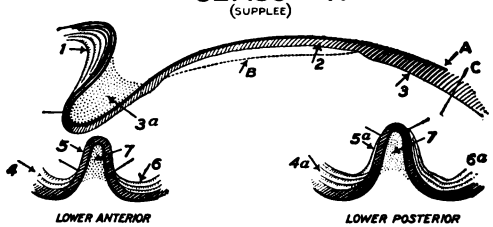
3. Varying depth of movable soft tissue under the membrane covering the rear third of the vault.

EXPLANATION OF MARKS — LOWER.

4-6. Buccal and lingual attachments connected to the ridge through an area of soft movable membrane (5).

4a-6a. Same condition in the molar region.

CLASS 4.
(SUPPLEE)



EXPLANATION OF MARKS — UPPER.

The predominant characteristics of a Class 4 case is a soft ridge in front (3a), flexible tuberosities, or both.

1. Labial attachments that may be either high or low, but connected to soft ridge (3a).

2. The membrane may be thin, heavy, or varying in density.

3. Movable soft tissue in rear third of vault that may be small and shallow or large and deep.

B. A bony prominence that is often evident in this class of case.

EXPLANATION OF MARKS — LOWER.

4-6. Buccal and lingual attachment connected to soft ridge (7) through the movable membrane (5).

4a-6a. The same thing in the molar ridge.

The soft ridge (7-7a) as a general rule is thin, ribbon-like, and very flexible.

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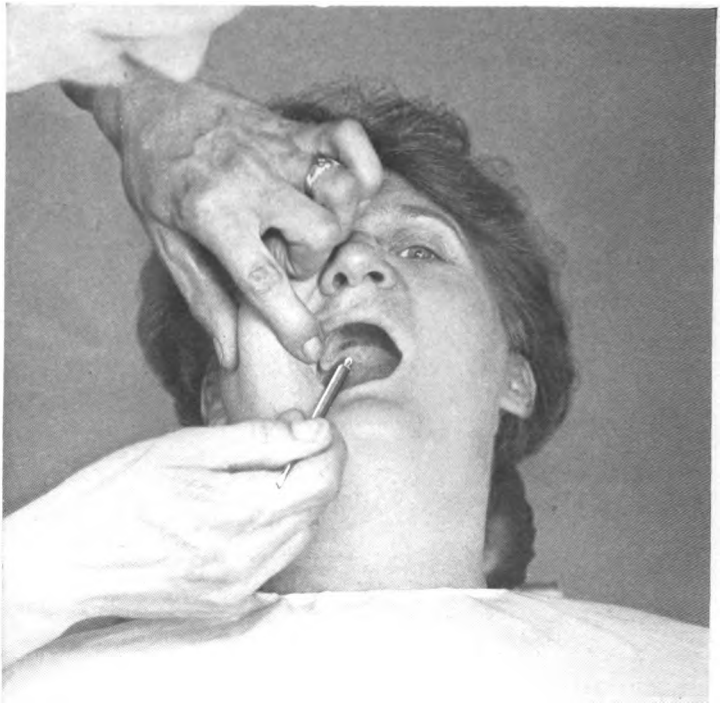

Fig. 2.

Locating Compressible Palatal Tissues.

The posterior margin of the plate is to be located on the soft tissues which overlie the posterior area of the hard palate. These are compressible but do not move much. The ball end of an instrument, pressed against these tissues, can be felt and seen to compress them. Watch the soft palate and with a soft indelible pencil mark the palate ¼ inch back of where movement in these tissues begins when the patient says "Ah".

The tray should extend to this point to confine and support the compound and facilitate proper adaptation.

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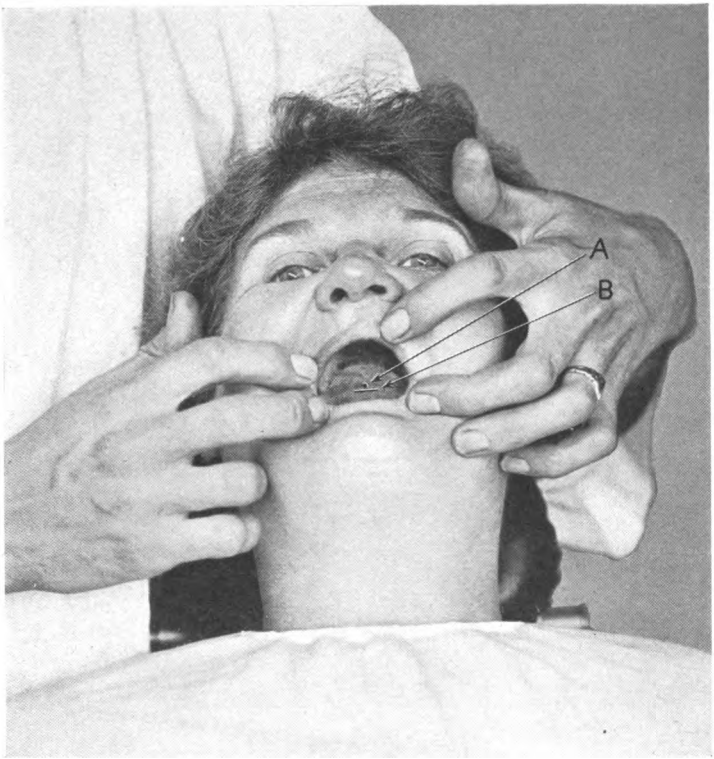

Fig. 3.

Determining Length of Tray.

The point "A" shows where movement of the soft tissue begins when the patient says "Ah". Trim the tray to reach to the line "B", 1/4 inch behind the point "A". For patients who gag easily, it may be necessary to stop the tray at or 1/8 inch in front of "A".

Impression trays of thin material are much more easily trimmed and adapted than thick trays.

Apply cold cream or white vaseline to the corners of the patient's mouth to protect them during impression taking.

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Fig. 4.

Trimming Upper Impression Trays.

"A" shows a thin aluminum perforated impression tray in the form in which it is received from the maker.

"B" shows the same tray with the flange cut away in the incisor and bicuspid region to facilitate adapting and trimming the compound. When this tray is in the mouth, it reaches back to the line "B" in Figure 3.

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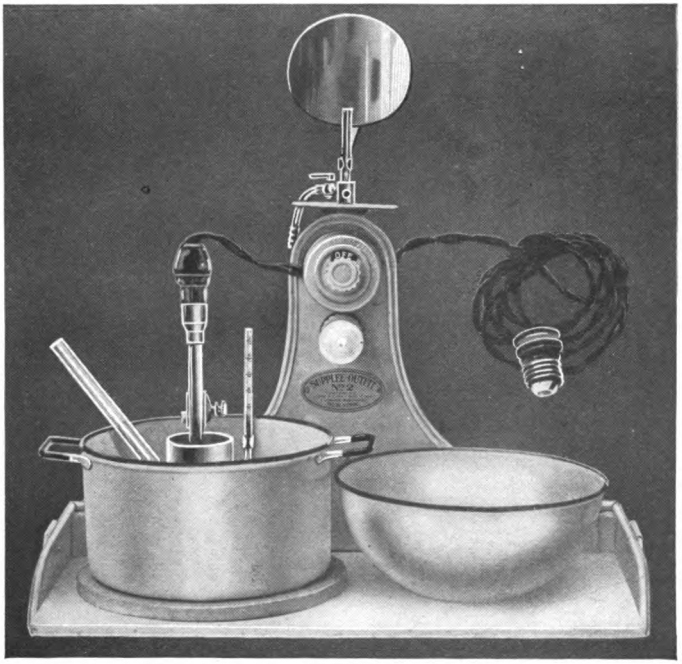

Fig. 5.

A Heater for Impression Compound.

Compound cannot be properly manipulated for impressions and bites unless the heat by which it is softened can be controlled so as to develop the required working qualities. We have found the heater here shown satisfactory. Have the water in the vessel about 3 inches deep. Keep the top of the heating ring ½ inch below the surface and the bulb of the thermometer 1 inch below the surface.

Immerse three sheets of compound in the water to soften for impression work while the tray is being shaped.

The temperature of the water should be about 150° F., never above 160° F. With the water at this temperature learn to soften compound to the bending stage, the moulding stage and the flowing stage.

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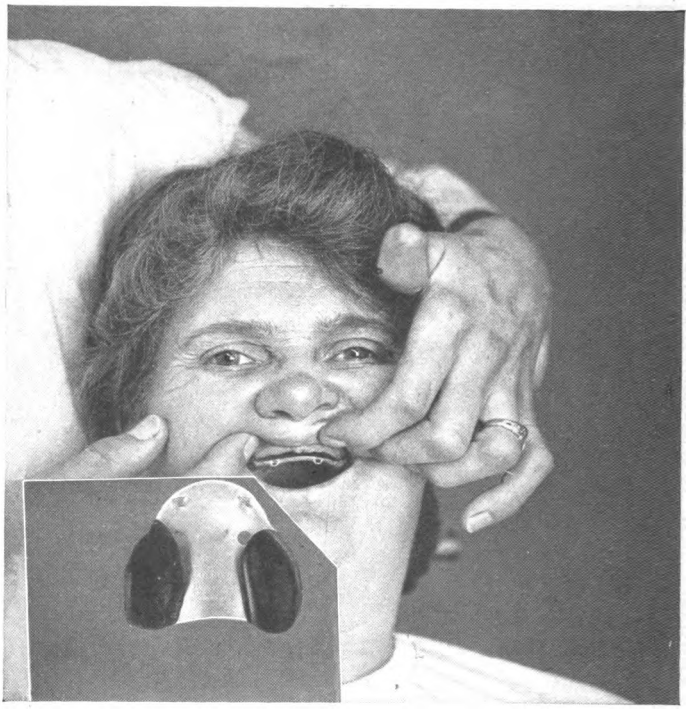

Fig. 6.

Perfecting the Fit of the Tray, Part I.

It is often impossible to properly adapt the tray to the tuberosities by sight. Soften two small rolls of compound in water at 150° F. and place on the tray as shown. Carry the tray into the mouth and press carefully upward until the posterior margin of the tray is about 1/8 inch from the vault and parallel to it, and the anterior margin is about 1/8 inch below the ridge in front, as here shown. The front margin of the tray should extend forward to a point directly below the most prominent part of the ridge. Remove the tray from the mouth and chill the compound.

The compound blocks are called "Adjustment blocks."

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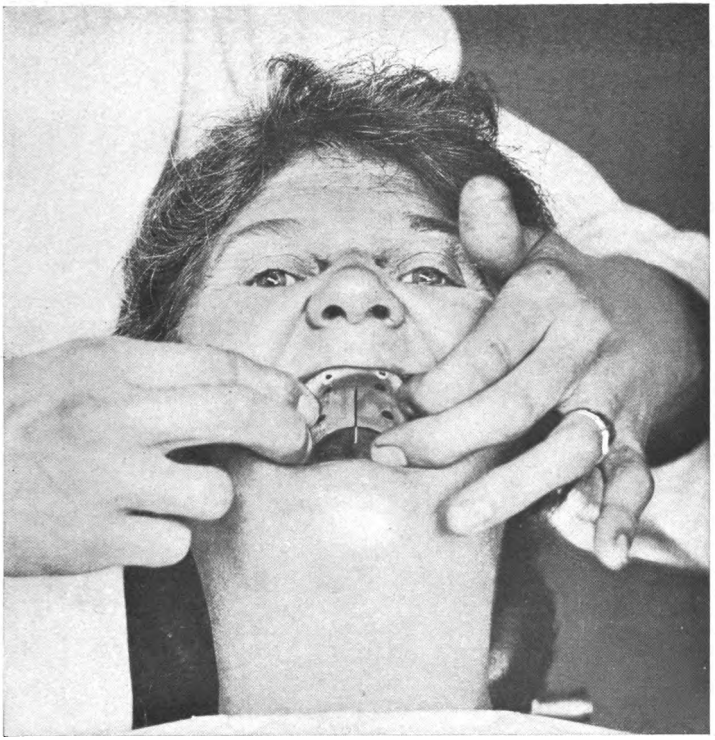

Fig. 7.

Perfecting the Fit of the Tray, Part II.

The median line of the soft palate is usually clearly pink or white and its location easily seen. Place the tray carrying the adjustment blocks in the mouth. When it is in position, make a plainly visible line, with a sharp excavator, on the lingual surface of the tray so that it continues the median line of the soft palate forward, as shown by the black line on the tray, in this illustration. Remove the tray and deepen the line.

When carrying the heel of the tray upward, in beginning to take the impression, this line on the tray should be directly below the median line of the soft palate.

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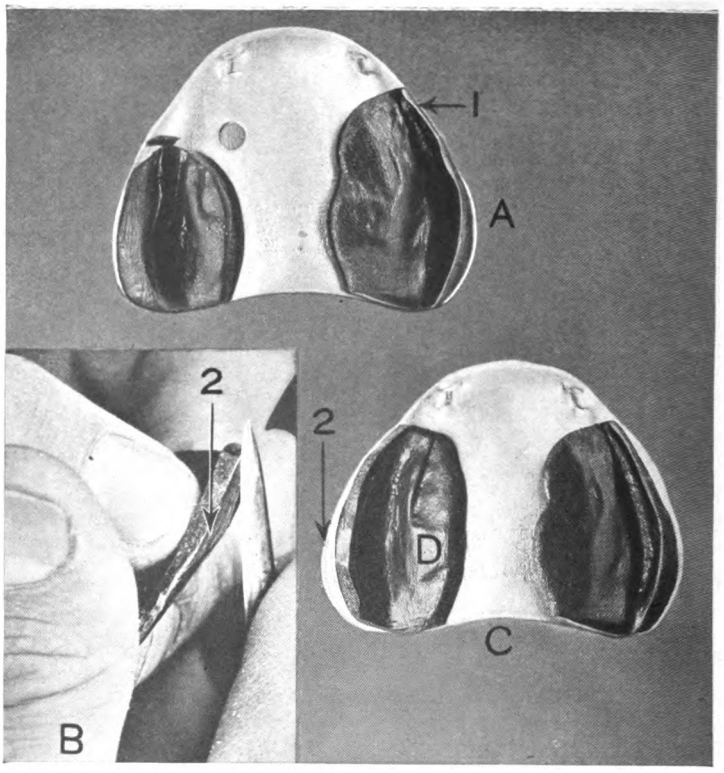

Fig. 8.

Perfecting the Fit of the Tray, Part III.

The thickness of the adjustment blocks shows whether the tray properly fits the tissues. At the point "1" in "A" the tray was too close to the tissues, as is shown by the compound margin being less than 1/8 inch thick. At point "2" in "A" the compound margin is more than 1/8 inch thick, showing that the tray was too far from the tissues.

Cut off the compound projecting through the perforation in the vault of the tray. Remove the adjustment blocks and trim the flanges which are more than 1/8 inch

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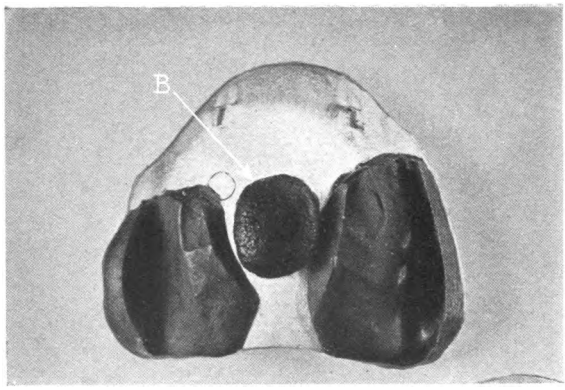

Fig. 9.

Perfecting the Fit of the Tray, Part III. Continued.

thick, until they are uniformly 1/8 inch thick as shown in "B".

Reseat each adjustment block in the tray. Grasp tray and block firmly between thumb and fingers at "D" and burnish the flange of the tray against the block. Whenever the compound flange is too thin, as at "1" in "A", insert a knife between block and tray and bend the tray outward. When the tray is properly fitted, remove the adjustment blocks.

If the tray is improperly fitted, there may be too much compound in the impression at the tuberosities. This may interfere with bite taking or the free movement of the mandible and the taking of correct Gysi records. In some cases the mandible moves so close to one or both tuberosities that proper records can be taken only by the method described on page 125.

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Fig. 10.

Preparing the Upper Tray for the Attachment of the Compound.

Grasp the dry tray with pliers and warm it in the flame. Heat the end of a stick of compound in the outer zone of the flame until it sputters and paint the palatal surface of the tray, as shown. Compound applied in this manner will adhere more firmly than if applied to a cold tray and will afford a better attachment for the impression compound.

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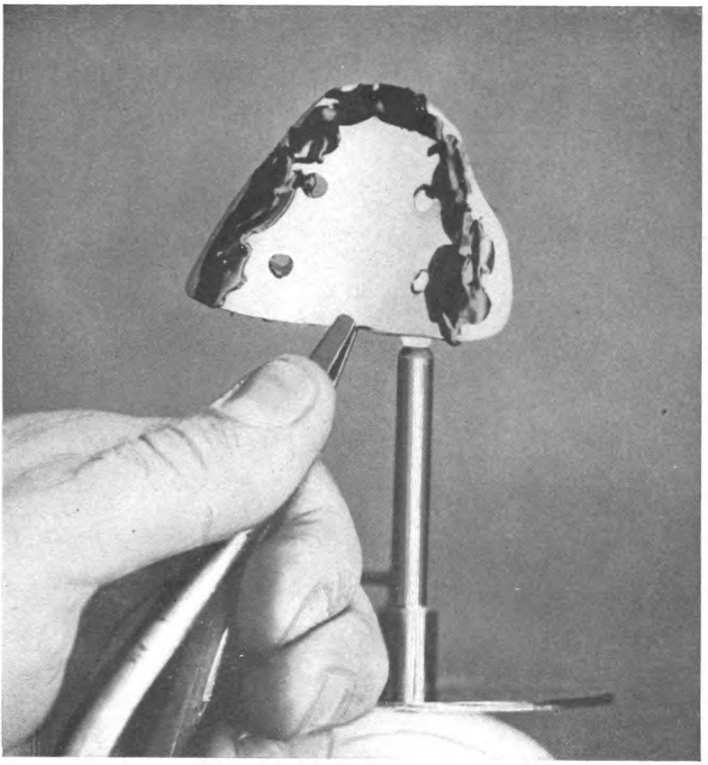

Fig. 11.

Preparing the Upper Tray for the Attachment of the Bite Rim.

At this time the under surface of the tray may be prepared for the attachment of the bite rim in such manner as to prevent it coming loose from the tray during the subsequent manipulation. Heat a stick of compound in the outer zone of a bunsen flame until it begins to sputter and paint the lingual surface of the ridge portion of the tray as shown here.

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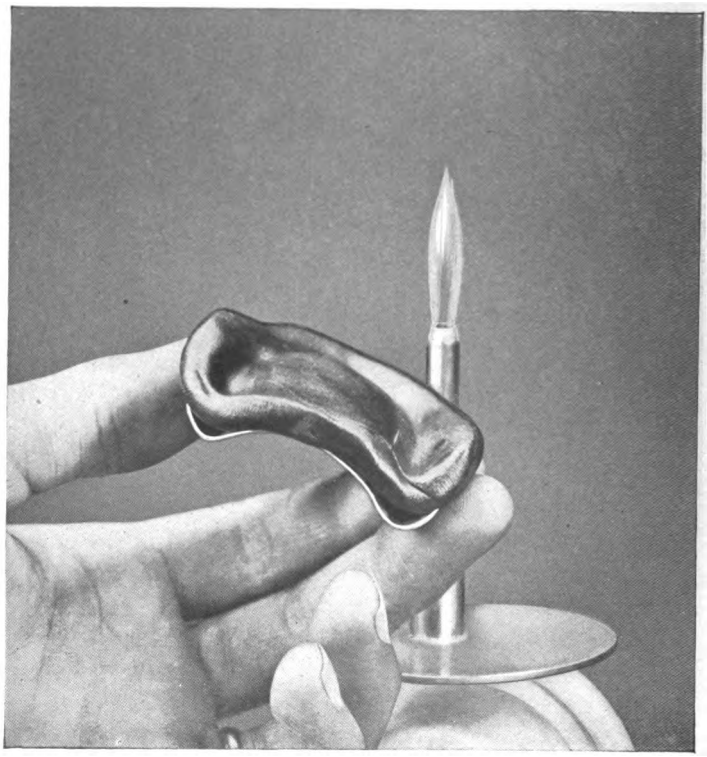

Fig. 12.

A Test for Quantity.

With the glass spatula, raise from the bottom of the heater, a small mass of compound and form into a sheet 3/16 inch thick and of approximately the area of the tray, with enough to turn up for the marginal flanges of required height as here shown. It is usually better to have a slight surplus than not enough. For patients who gag easily, less than enough may be used in the region of the heel, and deficiencies in the impression filled up by additions from a tracing stick later. Shape this test sheet as here shown. Remove it and dip in hot water and knead with the hand till it is of nearly flowing consistency throughout the mass.

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Fig. 13.

Attaching the Impression Compound.

The tray and the compound already painted upon it should be dried with a towel or bibulous paper.

Shape the mass of softened compound as shown in this picture and heat the point of it in the bunsen flame until it sputters. Press it quickly upon the compound already on the palatal surface of the tray and mould it to approximately the shape of the finished impression.

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Fig. 14.

Shaping the Compound in the Tray.

Shape the compound so that the mass in the center of the vault will be high but the posterior margin of the tray will be free from compound. As this mass touches the palate, it flows to the rear. Form a depression for the alveolar ridge and shape marginal flanges, which will go between the ridge and the cheeks. These flanges should be about 3/16 inch thick. This shaping should be practiced until one acquires skill to finish it while the compound still moulds easily.

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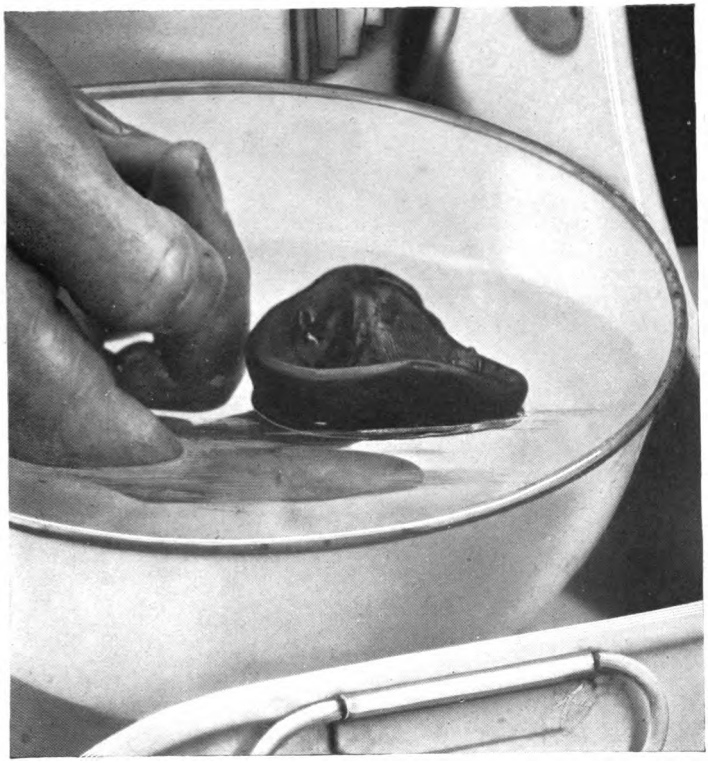

Fig. 15.

Chilling the Compound Next to Tray.

The tray and about $\frac{1}{8}$ inch of the compound next to it are immersed in cold water for about 5 seconds. This hardens the lower part of the compound, which assists in adapting the softer compound to the tissues, and prevents forcing the tray through the compound and into contact with the tissues. Tip the tray to right and left so that the buccal surface of the flanges may be slightly chilled also.

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Fig. 16.

Softening Palatal Surface of Compound.

Use an alcohol lamp and a mouth blowpipe. Direct a small blowpipe flame against the compound in the center of the vault and soften it until the surface is smooth and of a flowing consistency. The compound in the center should be heated to a greater depth than that portion of the material which is to come in contact with the crest and sides of the alveolar ridge. When the compound in the center has been sufficiently warmed, direct the flame into the depression for the ridge. Heat until the surface there is smooth. Do not heat the ridge surface of the flanges enough to cause them to fold over on themselves. Do not allow the flame to rest in one place. Keep it moving.

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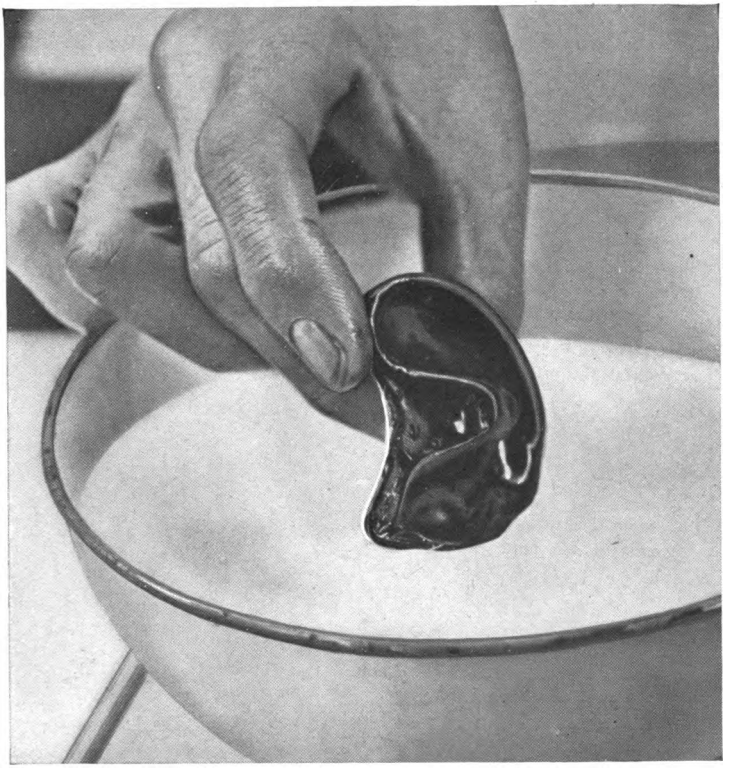

Fig. 17.

Chilling the Right Hand Marginal Flange.

Touch the side of the right hand marginal flange of the tray and compound to cold water or ice-water, but do not allow the cold water to work over onto the surface heated with the blowpipe. The object is to stiffen the compound flange so that it will not fold over upon itself when introduced into the mouth. Proper technic will make the buccal surface of the flange hard and leave the inner surface soft and flowing.

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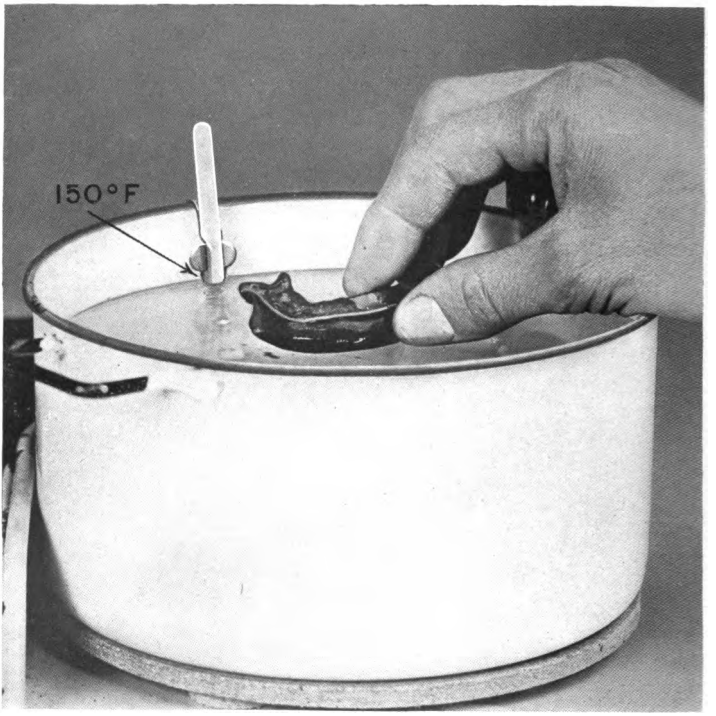

Fig. 18.

Equalizing Surface Temperature of Compound.

The hardening of the buccal surface of the marginal flange should have occupied not more than three seconds and the surface of the rest of the compound should still be too hot to permit introducing into the mouth without burning. Invert the tray and compound over the hot water as shown here, dip the blowpipe heated surface into the hot water and immediately withdraw it with a jerking motion. This operation must be very quickly performed, or the hard layer next to the tray and the flanges will be unduly softened.

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Fig. 19.

Introducing Compound for Upper Impression.

Part I.

Support the tray on the middle finger, guiding it sideways with the thumb and forefinger. Hold the right side of the impression toward the patient. Carry the right side of the impression into the mouth and against the right corner of the mouth. Distend the left side of the mouth with the left forefinger. Rotate the tray quickly so that the left heel passes the left corner of mouth. The left forefinger protects the left flange from being bent by lip pressure.

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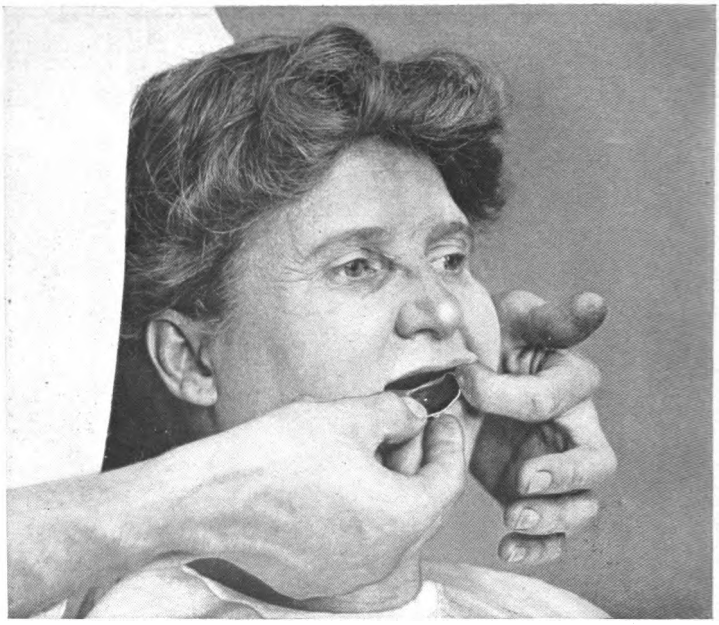

Fig. 20.

Introducing Compound for Upper Impression, Part II.

With the finger of the left hand, pull the cheek outward to protect the marginal flange on left side. At the same time, pull the tray and compound a little to the right and drop the left flange. The right buccal flange may have been bent slightly and this procedure assists in passing it upward between the ridge and the cheek. Move the tray upward and a little to the left to offset the previous pull to the right and the tilting. Hold the tray in this position with the compound lightly in contact with the tissues, and make sure that the front and back portions of the tray bear the relation to the ridge shown in Figures 6 and 7. Now press the tray about half-way home and hold it in this position during the manipulation described for Figure 21.

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Carrying the Compound Flanges High.

With the left index finger press the left buccal flange upward and inward between cheek and ridge, from tuberosity to cuspid as shown at "A".

Withdraw the left index finger with a sliding motion upward and forward until it is in the position shown at "B". This stretches the lip and cheek muscles and places the labial and buccal soft tissues in a favorable position for taking the impression. Pat the compound from cuspid to cuspid lightly upward and toward the ridge.

Substitute the left middle finger for the right middle finger supporting the tray as shown at "C".

Manipulate the right buccal flange with the right index finger as the left buccal flange was manipulated in "D".

Return the index and middle fingers to the position shown at "C" and press the tray home.

Release the right hand and hold the tray firmly in position with the left. With the index finger of the free hand, make pressure on the outside of the cheeks opposite the vertical center of the compound flange and force the compound gently upward and inward against the ridge.

Chill the compound by means of ½ inch cotton rolls wrung out of ice-water, or with low pressure air. Do not remove the impression until it is absolutely hard.

The impression will now usually show marked suction.

Extreme caution should be employed in removing the impression. Many impressions are spoiled in removal by faulty technic. Insert an index finger between the cold compound flange and the cheek and lift the tissues somewhat as shown at "A" to admit air between the ridge and flange. Work impression gently downward and forward in such way as to drop the left heel and side until the air works freely under the impression, when it will release.

If the patient can close the lips and distend the cheeks with air, the impression will be dislodged with a minimum danger of distortion. Immerse impression in cold water and allow to remain ½ minute.

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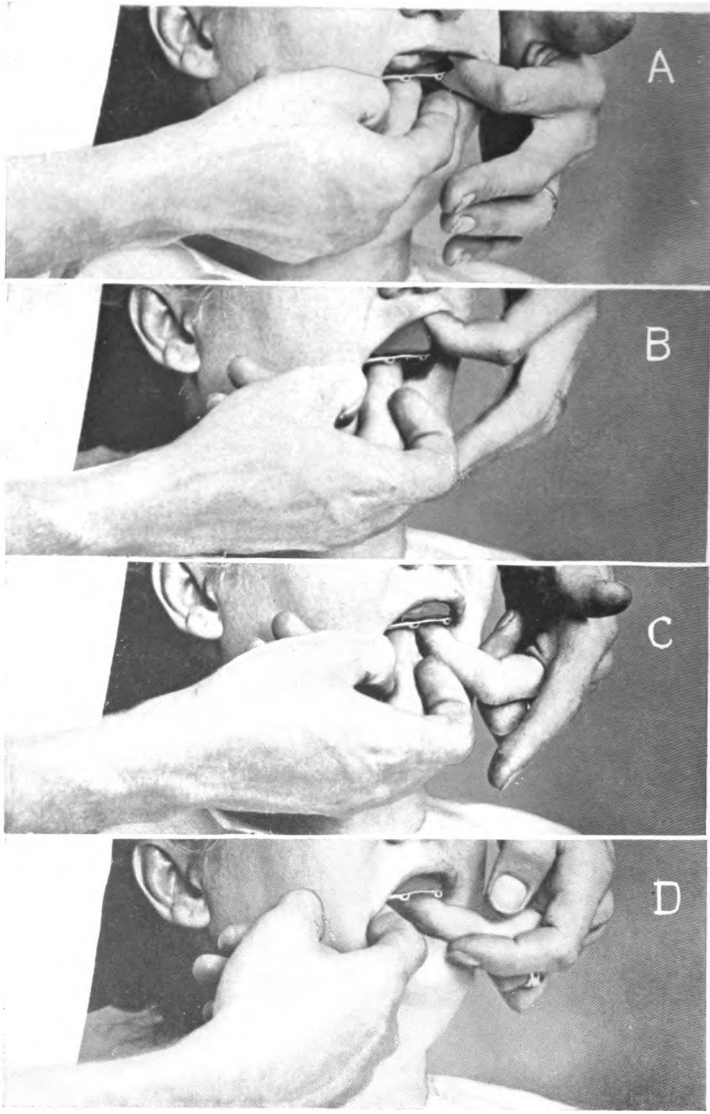

Fig. 21.

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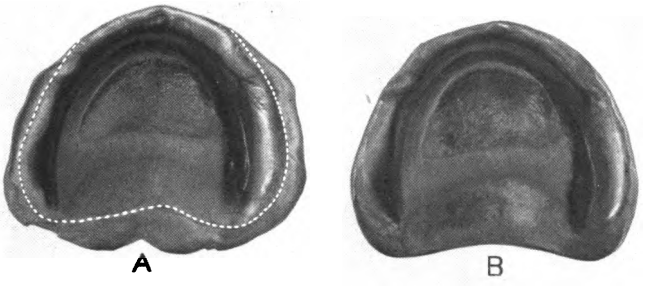

Fig. 22.

Trimming the Surplus from Upper Impression.

The manipulation described has turned over the surplus material shown at "A", leaving the impression upon which the final muscle trimming will be done in the area within the dotted line. With a sharp knife cut away the surplus material in such way as to leave the margin of the flange not less than 1/8 inch thick, which is less liable to be distorted by the rapid absorption of heat than a thinner flange. It will be safer for a beginner to leave the flange a little more than 1/8 inch thick.

As a thick flange can be less rapidly muscle trimmed than a thin one, one or two more heatings may be necessary, but this is compensated for by the reduced danger of flange distortion.

The impression, after the removal of the surplus, is shown at "B".

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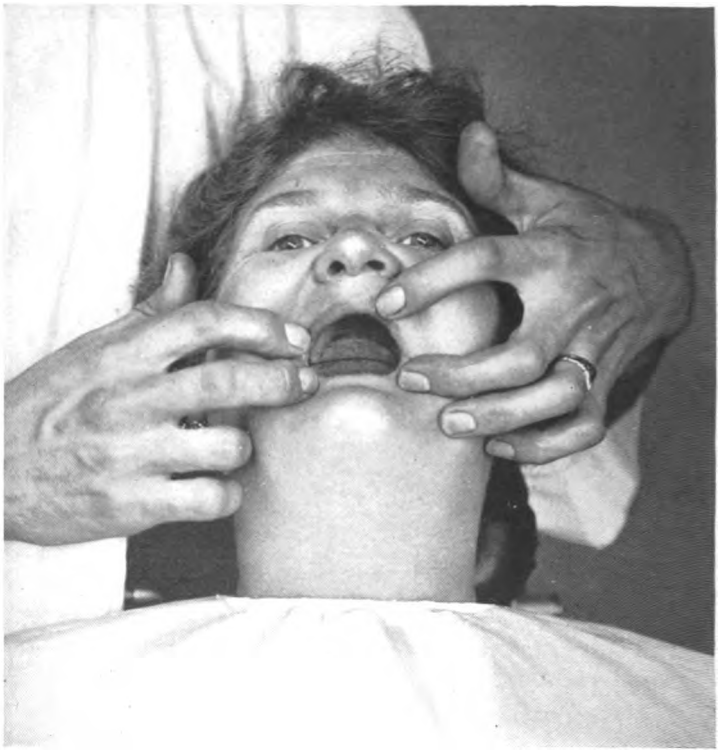

Fig. 23.

Trimming the Impression for Length.

Trim the tray and impression in normal cases, to reach back to the point where movement of the soft tissues begins, when the patient says "Ah". To do this, trace a line at this point on the soft palate and transfer it to the impression. The ends of this line should rest on the compressible but non-moving tissue in the depression behind each tuberosity, and the line should cross the vault where movement in the tissues commences.

Roll a swab of cotton tightly on an instrument, and with the application of firm pressure, wipe the tissues of the posterior part of the vault free from mucin.

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Moisten the point of a soft indelible pencil in water and draw this line. Slightly moisten the impression, place it in the mouth, press it firmly against the vault, and rotate it a little, if possible, thereby transferring the line from the tissues to the impression as shown at "B" in Figure 20. Too much moisture on the impression will make the line indefinite.

Remove the impression and trim the tray and impression to the line, cutting so as to hold the tray against the compound.

If there is doubt as to where the line should rest, it is better to leave the impression a little too long and trim the plate if irritation makes it necessary.

In some mouths the area of compressible but non-moving tissue behind the tuberosities is very narrow because of unusual ligamentous attachments. To determine the character of these attachments, have the patient open the mouth as wide as possible and watch the tissues. Make a dot on each side where movement commences when the ligament becomes tense. If the denture is finished to rest upon the point of attachment of this ligament, it will be pulled loose whenever the mandible is dropped, by the action of the ligament.

In cases where the mouth presents a soft, flabby ridge in front, the plates must be made longer than in normal cases, to prevent breaking the valve fit in the back by the unavoidable excessive movement of the plate in speech, swallowing and mastication. In extreme cases it may be necessary to extend the plates ¼ inch beyond the point where movement commences when the patient says "Ah".

If the impression does not show suction, add black wax as shown in Figure 64. If the addition of the wax does not produce the desired result repeat the impression technic, beginning at Figure 10.

In very difficult cases a beginner may find it necessary to follow the alternative technic under the title "Compound-Plaster Impressions."

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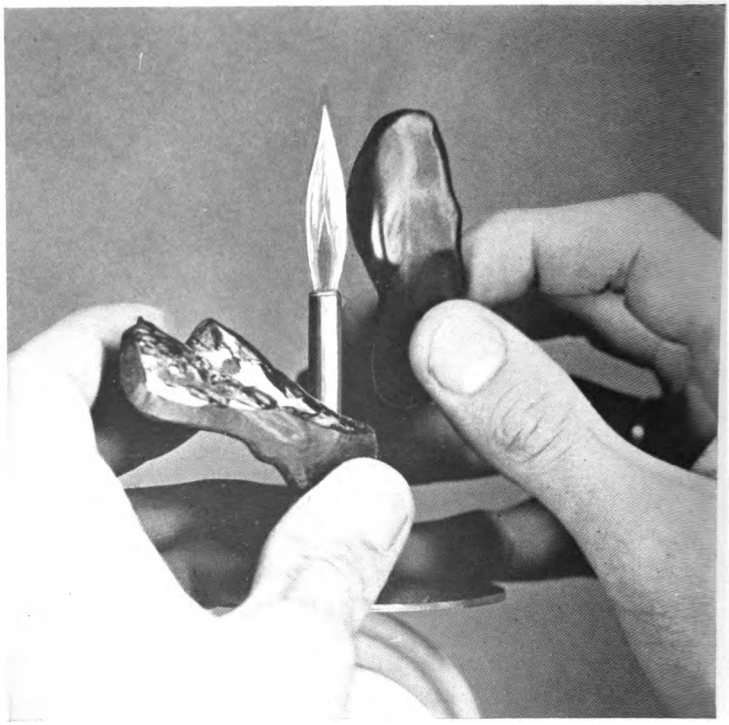

Fig. 24.

Attaching the Upper Bite Rim, Part I.

Take from the hot water enough compound to form a roll ½ inch in diameter and 3 or 4 inches long. Heat in the flame, until it sputters, enough of one side to reach from the first molar to the median line. Attach the heated portion to the previously prepared ridge area of the tray so that the end of the roll will be about where the distal side of the first molar is expected to come.

If this bite rim is left too long, it may interfere with equalizing the bite pressure or the free movement of the mandible and the taking of correct records of jaw movements.

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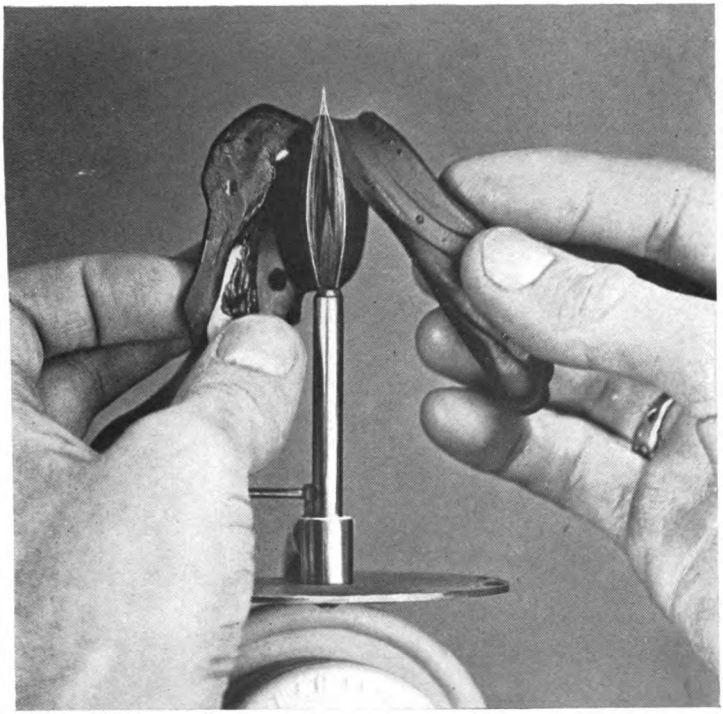

Fig. 25.

Attaching the Upper Bite Rim, Part II.

The tray is here shown held in the left hand, with the unattached portion of the roll forming the bite rim in the right hand. Direct a bunsen flame against that portion of the bite rim which will be attached to the tray, taking care not to heat the tray or the impression. When the compound sputters, withdraw from contact with the flame and press it against the tray. This heating should complete the attachment of the rim to the tray.

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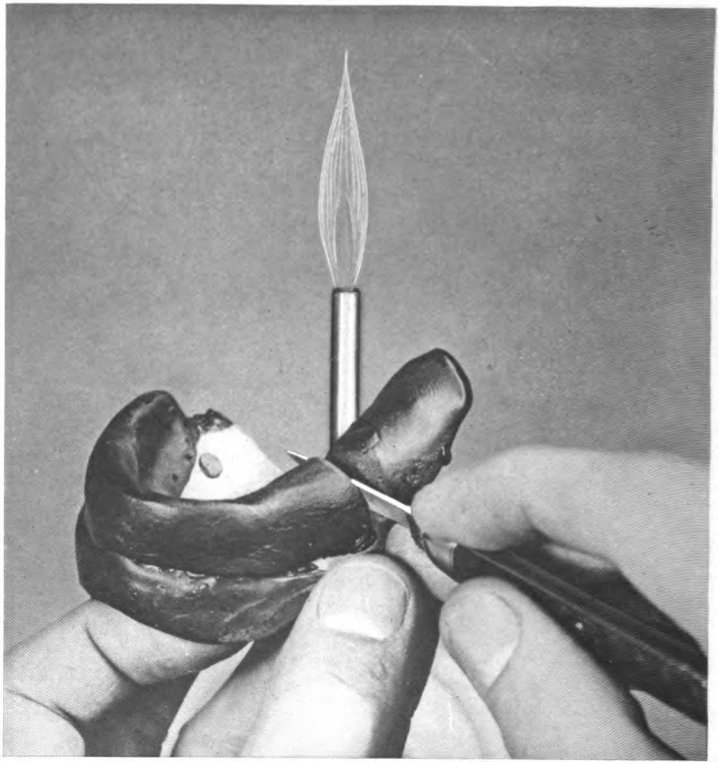

Fig. 26.

Attaching the Upper Bite Rim, Part III.

While the bite rim is still soft, cut off the surplus material about where the distal side of the first molar will come. Invert the impression as shown, and immerse tray and impression in cold water up to the point of the attachment of the bite rim to the tray. This is to prevent the heat in the bite rim softening the impression.

The bite rim is trimmed shorter than has been customary, to bring the stress in bite taking forward of the upward incline on the rear portions of the lower ridge.

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What the Occlusal Plane Is.

It is an arbitrary plane which has generally been accepted because it is useful in arranging artificial teeth.

This plane is generally parallel to a line on the outside of the cheek from the upper margin of the external auditory meatus to the lowest point of the wing of the nose. If, in edentulous cases, the occlusal surface of the bite rims be made parallel to it, and on a level slightly below the upper lip at rest, the most advantageous position for the arrangement of the teeth will be established.

The practical value of the occlusal plane is about as follows:

It establishes a generally accepted starting point for the arrangement of artificial teeth.

It is of value in mounting models in articulators, whether or not the face bow is used.

Its use facilitates the achievement of pleasing esthetic effects.

The cusps of Trubyte teeth can be set against this plane, as will be shown, to easily and quickly establish approximately correct compensating and lateral curves.

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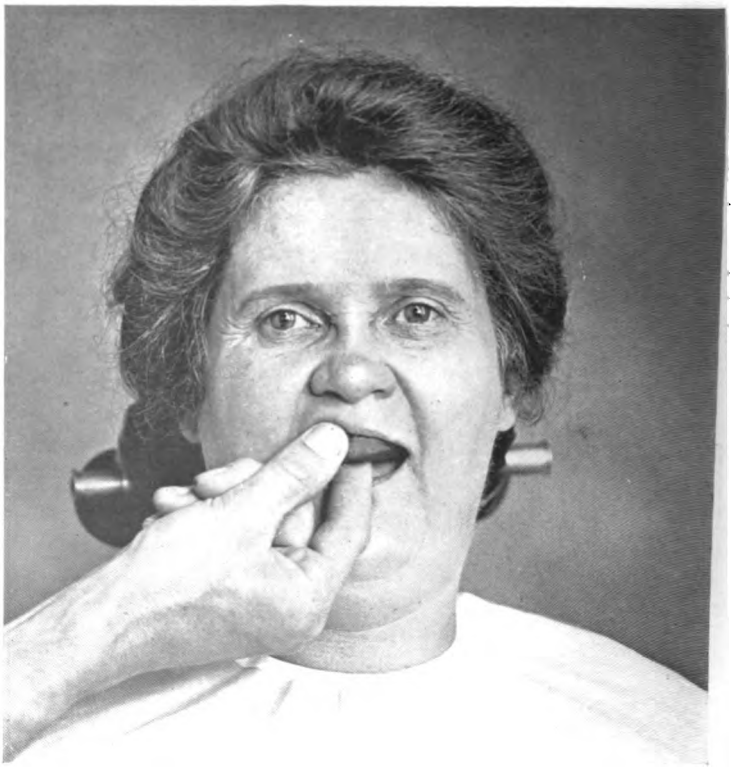

Fig. 27.

Establishing the Plane of Occlusion, Part I.

Dip the bite rim in hot water until it is plastic, which requires, usually, about 10 seconds. Put the impression with bite rim attached into the mouth. Mould the bite rim in the labial and buccal regions to about the contour the teeth are to take.

Make sure that when the moulding of the bite rim is completed it is directly above the lower ridge. This will prove to be important in later stages of the work.

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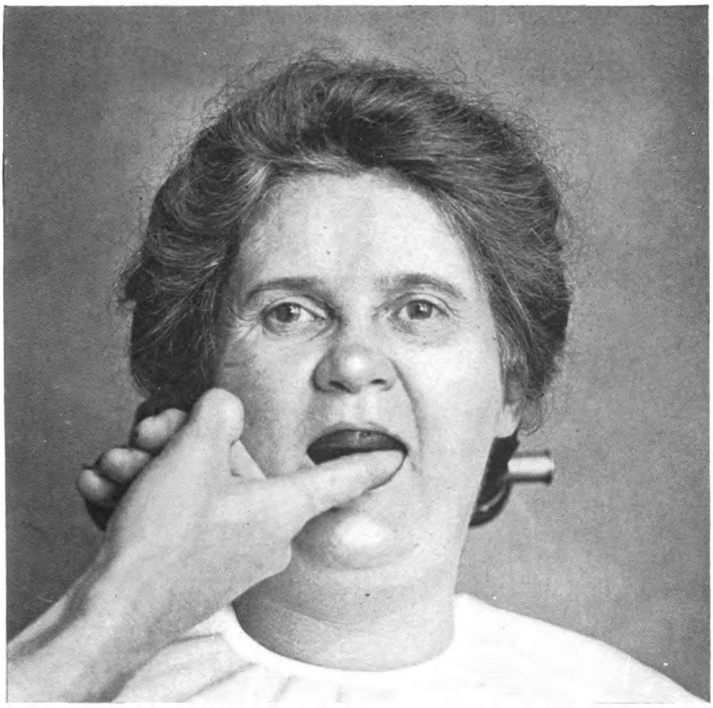

Fig. 28.

Establishing the Plane of Occlusion, Part II.

When the contour of the bite rim has been satisfactorily established, press the occlusal surface of the bite rim in the front of the mouth upward with the finger, as shown, pushing the surplus toward the center of the mouth, until, when the patient raises the lip as in smiling, the bite rim is exposed about as the teeth are to be.

Press the sides of the occlusal surface of the bite rim upward in the same manner until they are approximately parallel to the occlusal plane. When the patient raises the lip, it should be possible to see more of the compound in the incisor region than in the posterior region.

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Fig. 29.

The Plane of Occlusion, Front View.

The horizontal position of the occlusal plane, when seen from the front, should be parallel to a line through the pupils of the eyes.

After the occlusal surface of the upper bite rim has been made approximately parallel with the occlusal plane, lay a ruler across the anterior section, as here shown, and test the parallelism with the line through the eyes.

If one side of the bite rim is too deep, whittle it until the plane is established.

In cases where the lip is habitually raised unevenly, giving the mouth a crooked appearance, the best esthetic results will be obtained by setting the edges of the teeth pretty closely to the plane here described.

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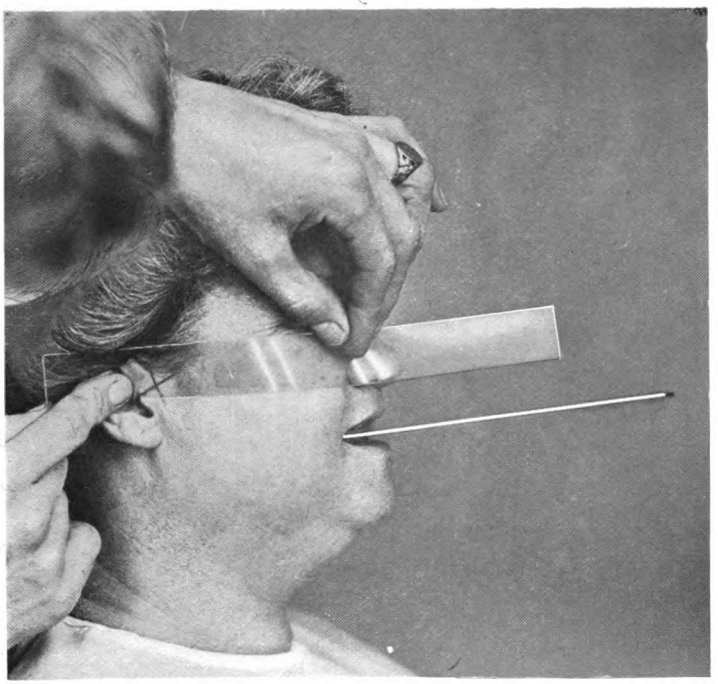

Fig. 30.

The Plane of Occlusion, Side View.

In edentulous cases, establish the antero-posterior level of the occlusal plane by drawing a line on the face from the upper margin of the external auditory meatus to the lowest part of the wing of the nose, by means of a ruler, a strip of celluloid or a cord. Parallel the occlusal surface of the bite rim to this line and test the parallelism by holding a ruler against the occlusal surface of the bite rim as shown above, and observing the projecting portion. Cut away the occlusal surface or add to it at the heel as may be necessary to establish the plane.

In the preceding illustration and this, the ruler is shown supported in position, with the operator out of view, for photographic reasons.

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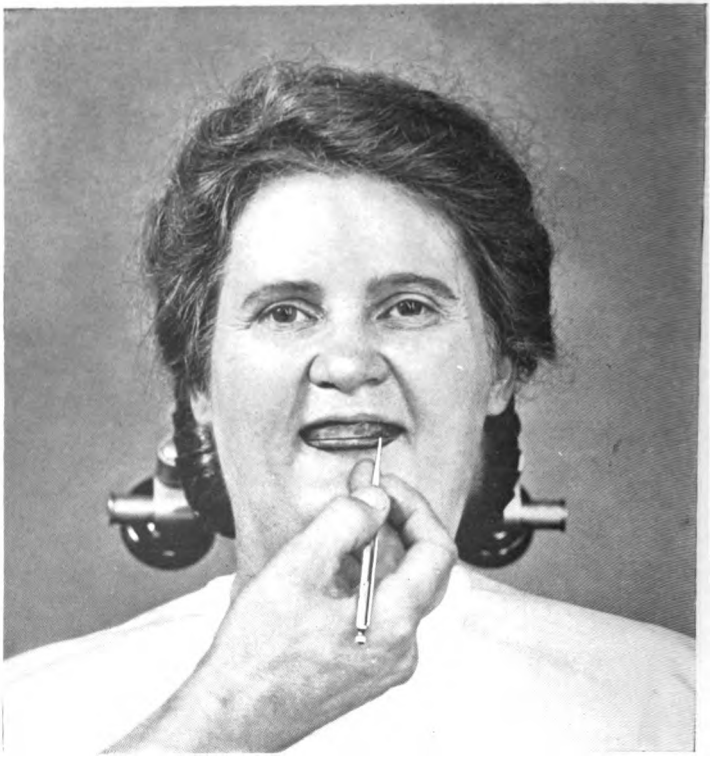

Fig. 31.

Correcting Errors in Bite Rim Depth, Part I.

The edges of the upper centrals are usually exposed when the lips are slightly parted. The upper lip is usually raised, in smiling, to the necks of the upper centrals. Trim the upper bite rim so that it is exposed from 1/16 to 1/8 of an inch when the lips are slightly parted.

Stand several feet in front of the patient. Have her smile. Decide whether the depth of rim exposed is greater than the length of the teeth suitable for the face. If it is, trace a line on the labial surface, as here shown, and re-establish the plane of occlusion at this level.

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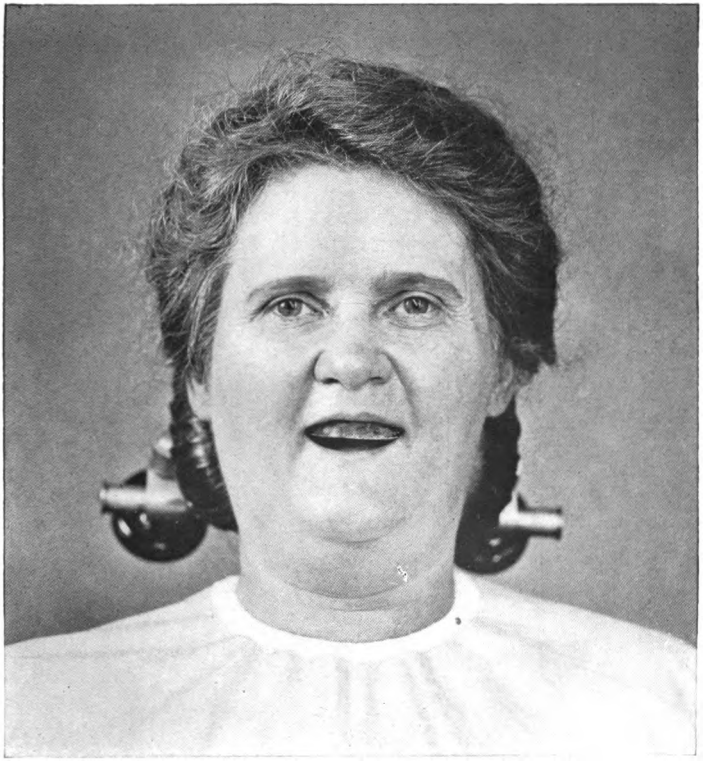

Fig. 32.

Correcting Errors in Bite Rim Depth, Part II.

If it is necessary to trim the surface of the bite rim, pass the surface to be trimmed through the side of the bunsen flame and heat it to a depth of not more than 1/16 inch. Cut with a cold, very sharp knife. If much is to be cut away, make several shallow heatings rather than one deep heating.

The patient is here shown with the bite rim trimmed to the proper vertical depth and with the occlusal plane parallel to the line through the pupils of the eyes.

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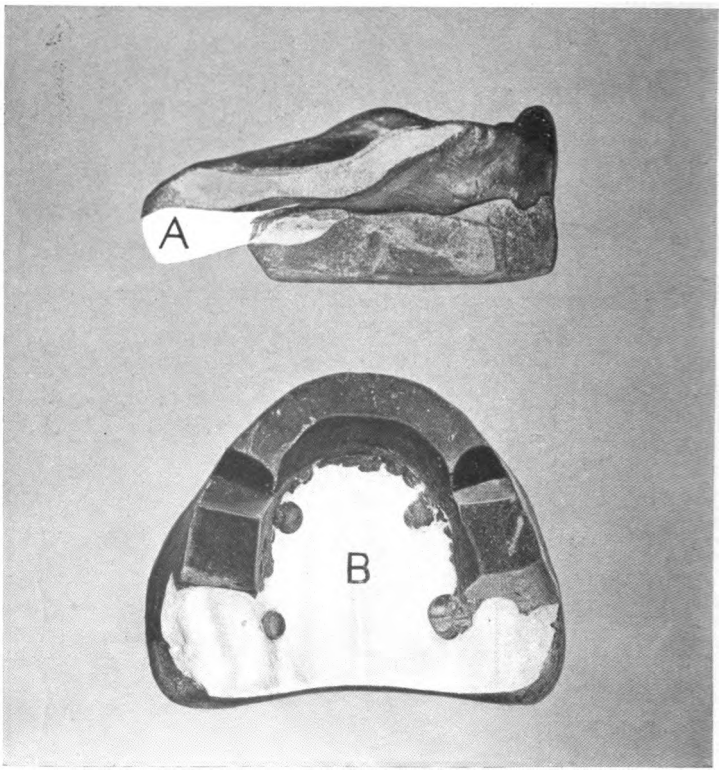

Fig. 33.

Completing the Upper Bite Rim.

Fill in any serious irregularities in the occlusal surface of the bite rim by tracing on soft compound. Heat the entire occlusal surface to a shallow depth in the side of the bunsen flame and press upon a moist glass surface to make it flat and smooth, but do not change the vertical height or occlusal plane.

Cut notches like those shown at "B". These should be wide and flaring, irregular in shape, about 1/8 inch deep and inclined toward the median line at different angles. These will insure proper locking of the lower bite rim.

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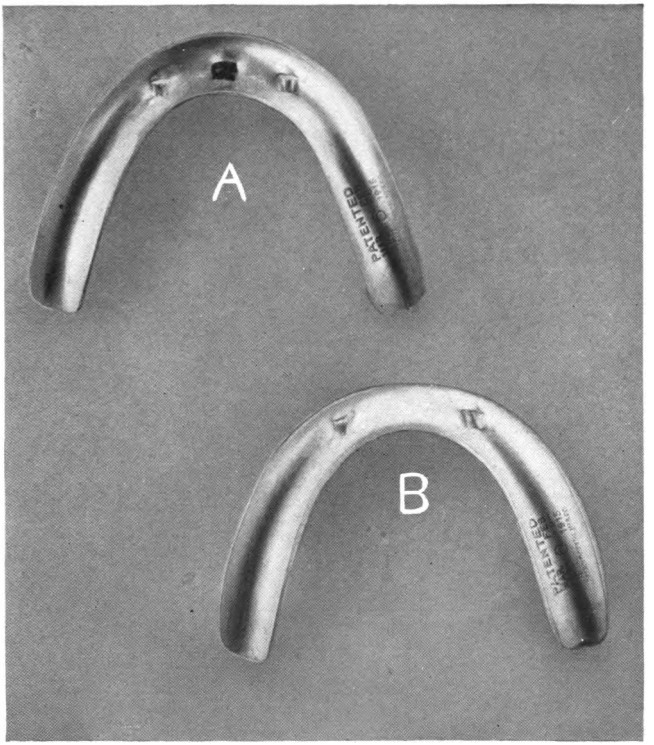

Fig. 34.

Lower Trays.

It is advantageous to select one of the larger sizes of lower impression trays and shorten it to fit the case, because the larger size has a wide flange in the bicuspid and molar region, which will better support the compound.

A thin metal, lower impression tray as received from the maker is shown at "A". At "B" is shown the same tray with the labial flange cut away from cuspid around to cuspid and the lingual flange partly cut away in the same region to avoid pressure on the frenum.

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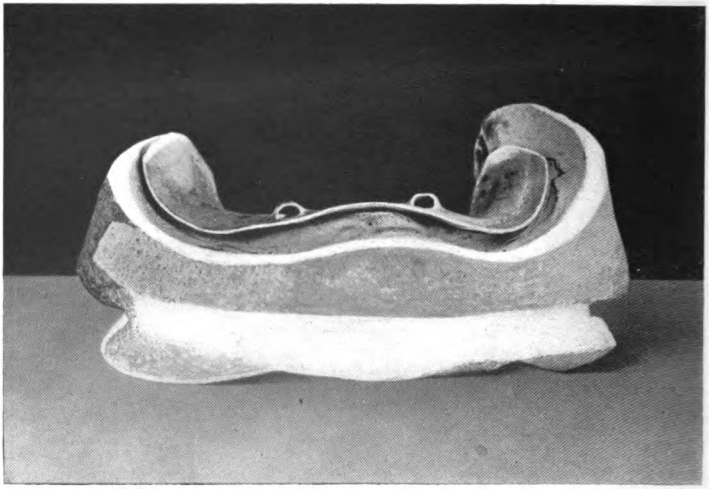

Fig. 35.

Shaping the Lower Tray.

With contouring pliers spread the flanges of the tray in the bicuspid and molar region so that the lateral contour is flatter than that of the ridge. Bend the tray to fit the curvature of the ridge in the incisor region and continue the bending so that the tray follows the curvature of the ridge in the bicuspid and molar region, as it does on the model, which is shown here purely for purposes of illustration.

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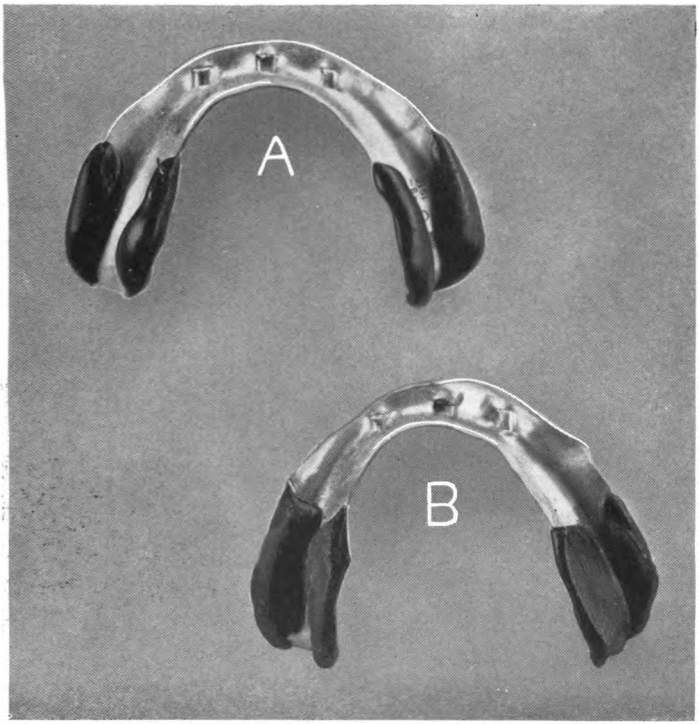

Fig. 36.

Guide Rimming the Lower Tray.

Heat about ½ inch of a tracing stick in the top of the bunsen flame and trace compound on the fitted tray, as shown. This compound should be a little over ⅛ inch in depth and several tracings will be required. If there is any tendency for the first tracing to run when the later tracings are made, chill in cold water. Note that the guide-rims are confined to the margins of the tray and do not touch the center.

To prepare the guide rims to go into the mouth, dip them into hot water until they are of a consistency which will require a slight pressure, but not a severe pressure, to mould. This will require from 2 to 4 seconds.

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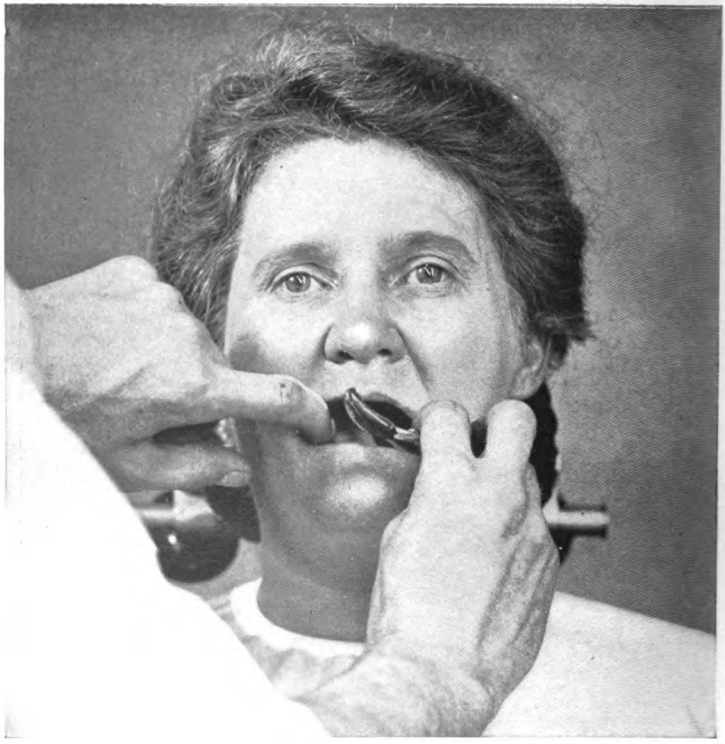

Fig. 37.

Inserting the Lower Tray.

Have the patient open the mouth wide enough to admit the tray but not to tighten the cheek muscles.

Stand in front of the patient. Carry the left side of the tray toward and into the mouth until the center, which is grasped between the thumb and finger, touches the left corner of the mouth. Distend the right corner of the mouth with the index finger of the left hand. Rotate the tray until the left side touches the cheek and the right end passes into the mouth. Continue the rotation until the tray is approximately centered. Release the tray and let it settle.

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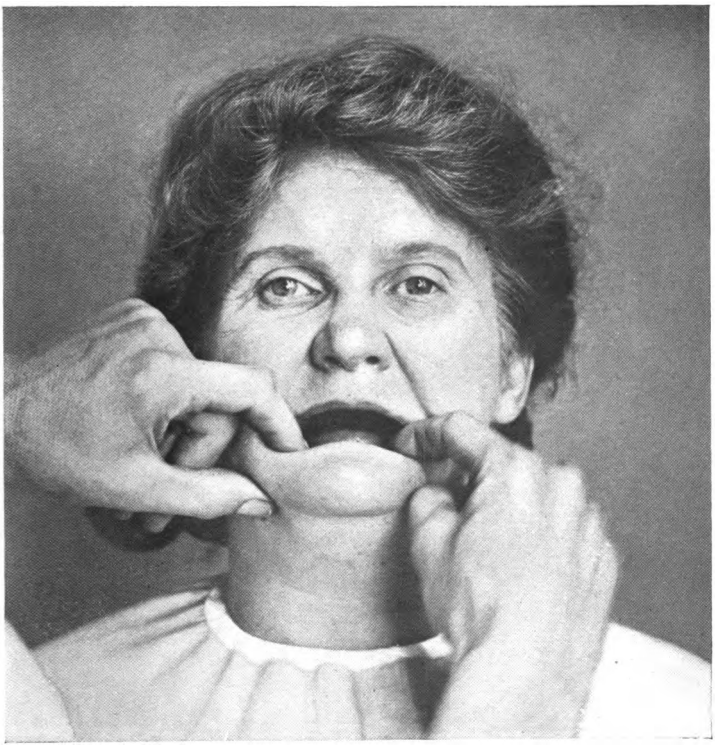

Fig. 38.

Seating the Lower Tray.

Make sure that the anterior margin of the tray does not extend forward beyond the labial surface of the lower ridge. This will bring the lower tray in the same relation to the lower ridge that the upper tray is to the upper ridge in Figure 6.

Make light pressure over the parts of the tray to which the compound is attached. When this pressure is properly made the tray will not be forced down into contact with the ridge anywhere but will remain about 1/16 inch above it all around.

Remove the tray immediately from the mouth and chill the compound in cold water.

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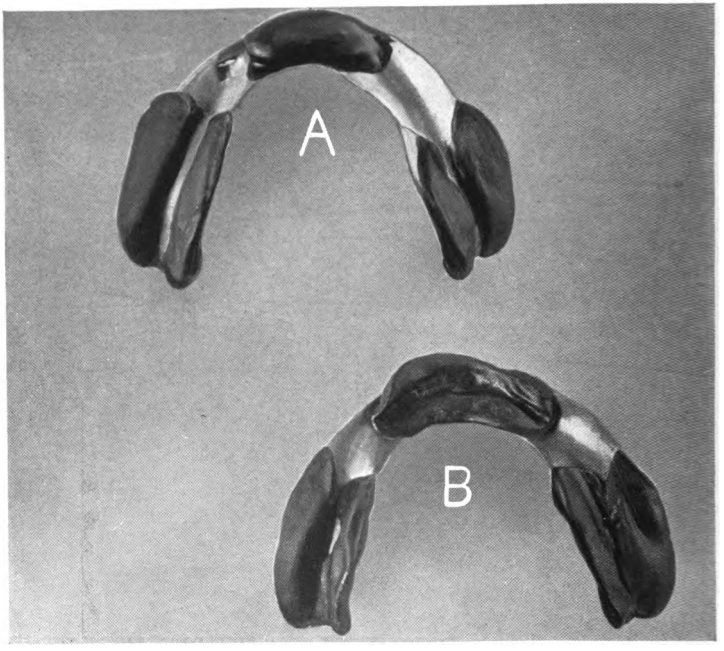

Fig. 39.

Seating the Lower Tray, Continued.

The guide rims at "A" show the result of the technic in Figure 38. The tray has since been dried and soft modelling compound traced in the hollow of the incisor region. Place the tray in the mouth. Make light pressure over the guide rims as in Figure 38. This accurately reseats the tray and takes an impression of the ridge in the incisor region. Do not apply pressure in the incisor region as it may tilt the heels of the tray upward and establish wrong relations.

Withdraw the tray; chill the compound; replace the tray and test for stability. If it is not stable, repeat the operation until it is.

Paint hot compound from a tracing stick upon the lingual side of the tray, as it was painted upon the upper in Figure 11.

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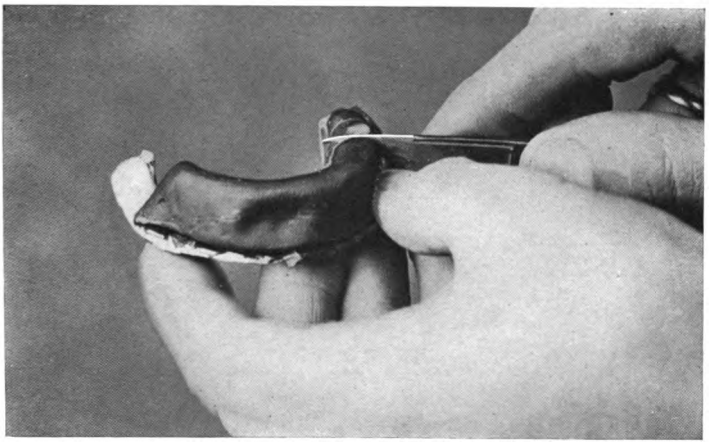

Fig. 40.

Forming the Lower Bite Rim.

Soften compound and form a roll as described for Figure 24. Bend the roll to fit the curve of the tray and cut it short enough so that it does not extend onto the upward incline at the heels.

Have the compound in an easily moulding stage but not soft, and press the roll against the tray so that it takes the imprint of the tray.

This bite rim should be made very shallow vertically and should permit the ridges to come too close together for good esthetic results. The height will be corrected later.

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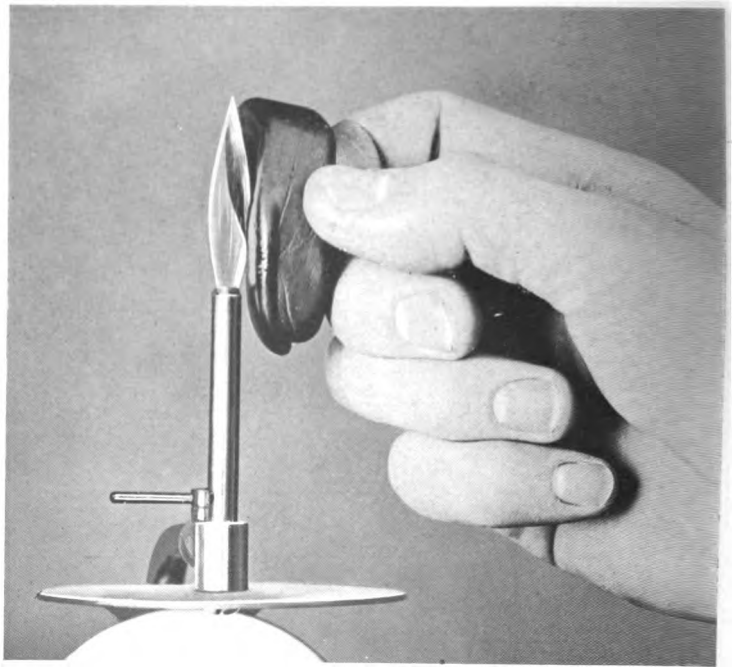

Fig. 41.

Attaching the Lower Bite Rim.

Remove the roll and dry it and the tray. Grasp the bent roll at the bicuspid region on the left side. Bring the left heel of the tray side of the roll against the base of the bunsen flame, as shown. Heat the compound until it sputters. Slowly rotate the roll toward the left, keeping the compound and flame in contact until the compound has been heated to a sputtering condition the full length of the roll.

Place the roll in position on the dry tray and press home. This makes the bite rim. Chill the tray to prevent the heat in the rim softening or changing the guide rims. Invert the tray and dip the occlusal surface of the bite rim in hot water to a depth of ¼ inch until it can be easily moulded.

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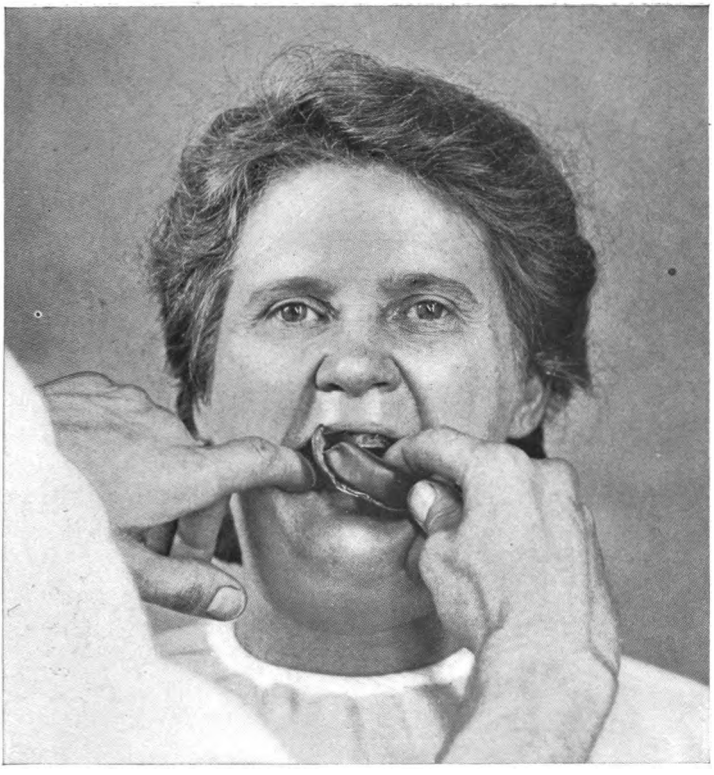

Fig. 42.

Carrying the Bite Rimmed Lower Tray Into the Mouth.

Grease the occlusal surface of the upper bite rim with cocoa-butter and place the upper impression in the mouth. Grasp the hard portion of the lower bite rim as shown and carry the left heel into the mouth and sideways against the left cheek, at the same time distending the right corner of the mouth with the left index finger. Carry the right heel inward past the finger and release the tray.

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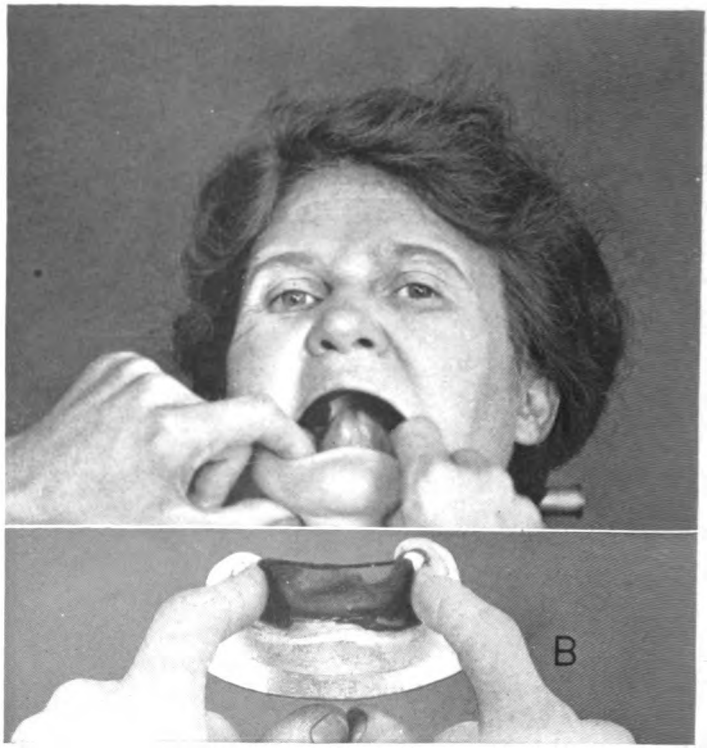

Fig. 43.

Placing the Bite Rimmed Lower Tray.

Stand in front of the patient. Place both index fingers against the buccal surfaces of the lower bite rim in the bicuspid region, as shown at "B" and make pressure inward and downward. Ask the patient to touch the tip of the tongue to the center of the vault, as far back as possible. This is usually near the heel of the upper impression. While the tongue is in this position, direct the patient to close the jaw as far as possible.

Chill the bite rim with ½ inch cotton rolls wrung from ice water, or with low pressure air, and remove it from the mouth.

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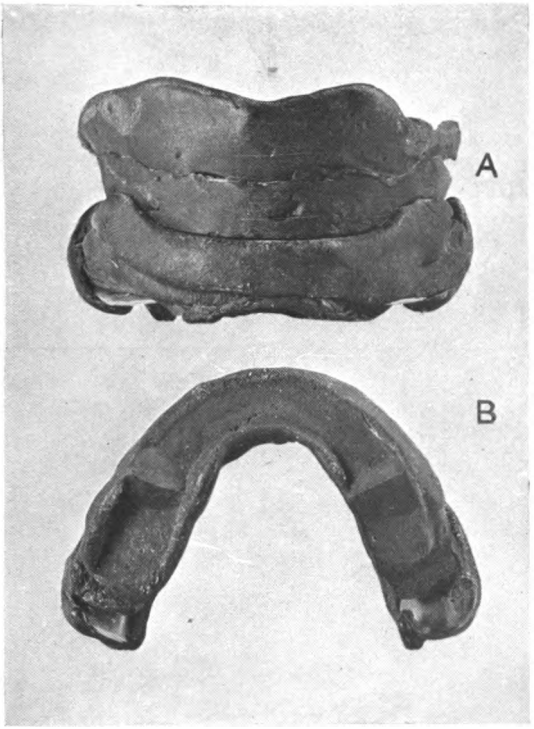

Fig. 44.

Trimming the Lower Bite Rim.

Figure "A" shows the upper bite rim in place on the lower as they were closed together in the mouth. The occlusal surface of the lower bite rim is shown at "B". The wedges of compound which filled the notches in the occlusal surface of the upper rim can be seen.

Trim away the excess compound on the buccal and lingual surfaces until the edges of the impression of the upper rim are reached. Do not trim off the wedges on the occlusal surface. Dry the ridge surface of the tray and guide rims. Replace the upper impression in the mouth.

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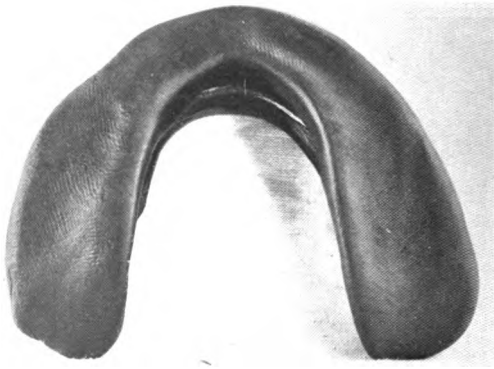

Fig. 45.

Shaping the Compound for the Lower Impression.

Shape a roll of compound ½ inch in diameter and as long as around the tray from heel to heel. Heat one side of the roll in the bunsen flame until it sputters and attach it to the ridge side of the tray. Mould the compound so that it will be narrow and relatively deep at the median line, and wide and relatively shallow at the heels, as shown here. It should be concave on the ridge side.

Heat the ridge side of this compound to a flowing condition with the mouth blowpipe as shown in Figure 16. The central depression of the compound should be softened to a greater depth than are the margins. To equalize the temperature and prevent burning the patient, carry the ridge surface into the hot water and remove with a quick, jerking motion.

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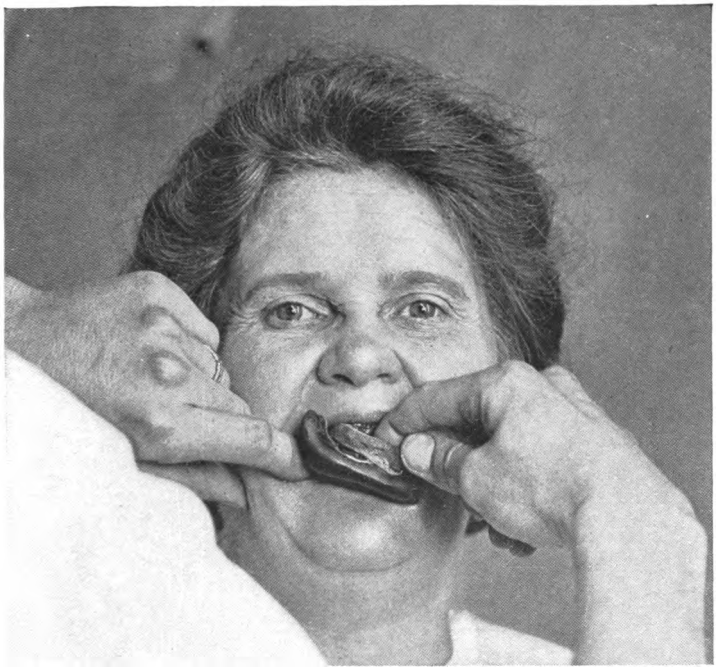

Fig. 46.

Inserting the Tray for the Lower Impression.

The lips and corners of the patient's mouth have been lightly coated with white vaseline. Carry the lower tray into the mouth as described for Figure 37.

As soon as it is in the mouth release it. Place the index fingers on the buccal surfaces of the bite rim in the bicuspid region as in Figure 43 and hold the bite rim off the ridge by pressing the index fingers toward each other against the buccal surfaces. This method of holding permits the dentist to move it or rotate it as desired. Request the patient to touch the tongue to the vault of the mouth. Guide the wedges on the lower bite rim into the notches in the upper bite rim. Have the patient close as far as possible and proceed as in the following illustration.

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Fig. 47.

Turning Up the Surplus Compound on Buccal and Labial Surfaces.

Instruct the patient to make a steady suction or negative pressure in the mouth. While this suction exists, under biting pressure, place the thumbs on the side of the face, as shown here, and press upward and inward against the lower margin of the compound, which can be felt to overhang the border of the jaw, forcing the compound against the buccal and labial surfaces of the ridge.

Part the lips but not the jaws and chill the compound with cotton rolls wrung out of ice-water, or with low pressure air.

When thoroughly chilled, carefully remove both impressions from the mouth and immerse in cold water.

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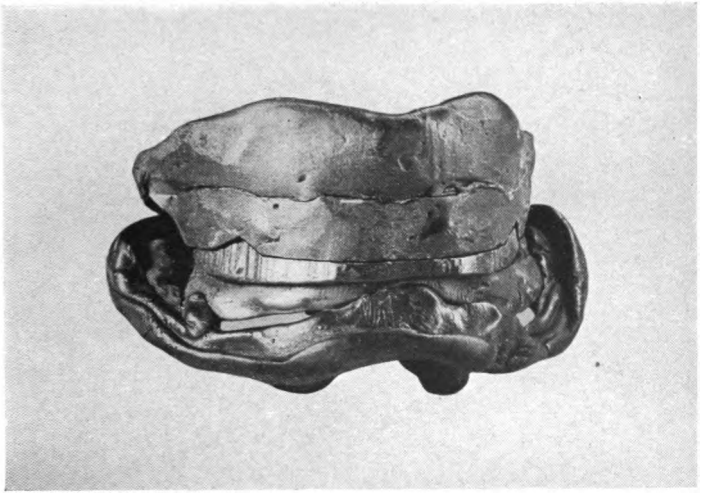

Fig. 48.

The Incomplete Lower Impression.

This illustration shows the lower impression as it results from the manipulation illustrated in the two figures immediately preceding.

Observe that the wedges on the occlusal surface of the lower bite rim fit into the grooves in the occlusal surface of the upper bite rim and maintain correct relations between the upper and lower. This automatically holds the lower tray in correct relation to the lower ridge as the patient bites into the soft compound and insures the taking of the impression under biting stress and negative pressure. These are the most favorable conditions for taking a lower impression.

This method of forming the two bite rims and of holding the lower in a fixed relation to the upper while the lower ridge is closed into the soft compound to take the impression is a complete reversal of the methods common for many years past. This method, once mastered, will be found very satisfactory.

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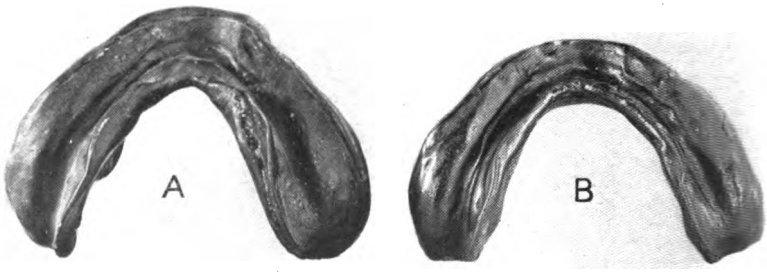

Fig. 49.

Trimming the Surplus From the Lower Impression.

"A" shows the ridge surface of a lower impression as it is at the end of the manipulation described in Figures 46 and 47.

"B" shows the same view of this impression after the manipulation described in Figures 51 to 54 inclusive was completed.

Trim away the surplus which is shown outside the white line in "A". This will leave the flange about ⅛ inch thick.

The impression in "B" is smaller in ridge area than that in "A". This is due to the "trimming" described in the steps to follow. A "trimmed" impression is less liable to interfere with the movements of the buccal and lingual groups of muscles and hence is more stable and comfortable.

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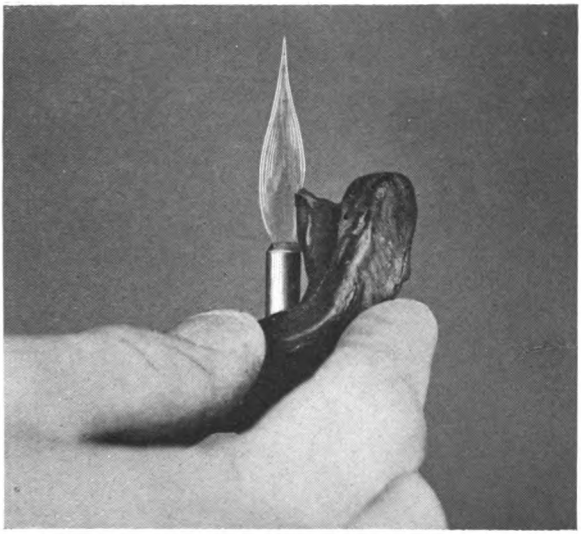

Fig. 50.

Technic for Heating Flange for Muscle Trimming.

In heating the flanges for muscle trimming, allow the heat to strike only the compound to be softened. Invert the lower to heat, but do not invert the upper. Hold the edge of the flange to be heated for muscle trimming against the side of the base of the flame, where the heat is less intense than at the top. In this position the heat is not deflected to soften the compound elsewhere.

Heat only the edge of the flange to a depth of 1/8 inch or as deep as judgment indicates to be necessary and skill in handling permits.

Heat the flanges of each impression in three sections, one from cuspid to cuspid, one from each cuspid to each heel. When one becomes expert, it may be possible to include two or more sections in each heating.

Dip the heated flange in hot water. Instantly remove with a jerking motion and quickly place the impression in the mouth.

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Fig. 51.

Trimming Lower Labial Flange—Cuspid to Cuspid.

Leave out the upper impression. Heat the lower labial flange from cuspid to cuspid. Place the lower quickly in the mouth and press on the occlusal surface in the bicuspid region, until the impression is properly and firmly seated. Have the patient draw the lip upward and inward over the bite rim. Massage the compound by thumb pressure upward and inward on the outside of the lower lip, beginning a little below the heated margin.

Hold the impression firmly in place until the flange has been chilled or is hard.

If only a little surplus is turned up, it may not be necessary to repeat. A beginner should repeat until an upward pull on the relaxed lip in this region will not raise the impression.

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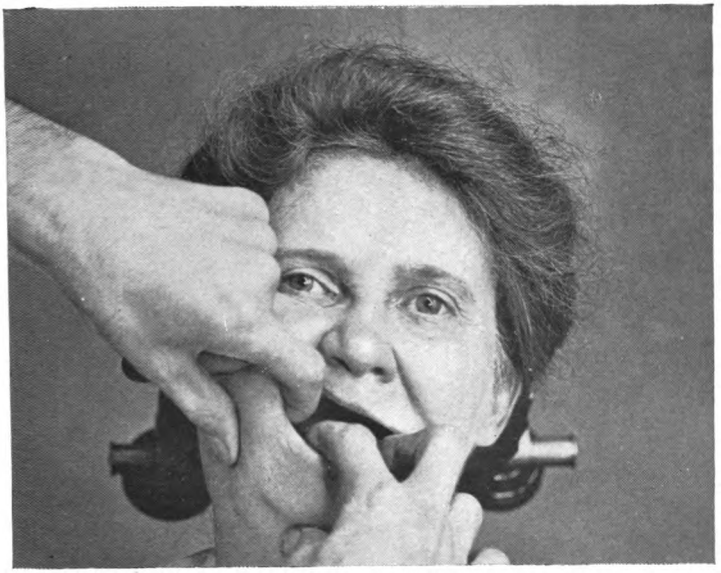

Fig. 52.

Trimming the Lower Buccal Flange.

Heat the buccal flange from cuspid to heel. Place the impression in the mouth and hold in place by pressing downward with the first and second fingers of the right hand in the bicuspid region. Make heavier pressure on the side which has not been heated than on the heated side.

Stand in front of the patient. Grasp the right cheek between the index and middle fingers of the right hand and pull it gently upward and inward against the margin of the softened flange. At the same time the thumb may pat the heated margin gently upward and inward, through the cheek. This position cannot be photographed. The illustration shows the action but not the position. Employ only gentle pressure. Trim the left flange in a similar manner.

The buccal margin may be regarded as trimmed when the pull of the muscles in this region will not dislodge the denture, or when the margin of the impression does not extend below the external oblique line.

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Fig. 53.

Muscle Trimming the Lower Lingual Flange

Part 1.

Heat the edge of the lingual flange from cuspid to cuspid in the manner illustrated in Figure 50.

Place the impression in the mouth and make pressure on the occlusal surface of the bite rim with the index fingers of both hands. Note that the thumbs, as shown here and in Figure 52, are pressed upward below the mandible to assist in making this pressure.

Cause the patient to place the tongue either between the upper ridge and the upper lip or outside the upper lip, at the same time moving it from side to side.

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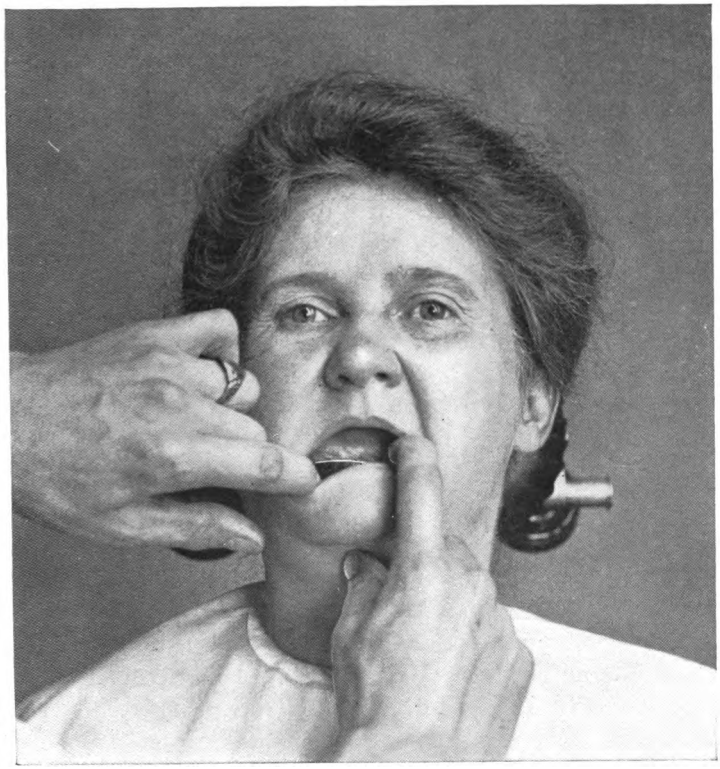

Fig. 54.

Muscle Trimming the Lower Lingual Flange Part 2.

Heat the edge of the left flange from cuspid to heel, in the manner described. Place the lower impression in the mouth, the upper being out, and hold in place as described for Figure 53.

Cause the patient to open the mouth as wide as possible and to then try to lick with the tongue between the right cheek and the right upper and lower alveolar ridges, in the region of the second molar.

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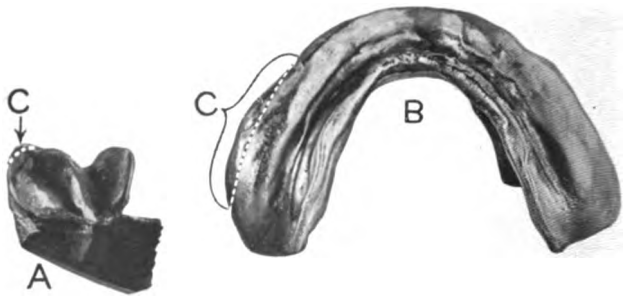

Fig. 55.

Trimming the Buccal Flange.

The white line in "A" shows a foreshortened view of the white line in "B" and the area marked "C" is the same in both figures. The margin of the compound to the left of the white line in "A" shows first a depression and then a mound. This mound is composed of the compound which has been forced downward so that it bears too heavily upon the muscles and if reproduced in the denture would cause irritation, when the muscles on which it rests come into play. The compound outside the white line in "B" should be trimmed to the contour of the dotted line "C" in "A". The section of the flange here shown at "C" corresponds to the section of the flange represented as extending below the external oblique line in the next illustration.

All denture margins should be rounded and pulley like, rather than sharp. This form permits the muscles to play over them without irritation.

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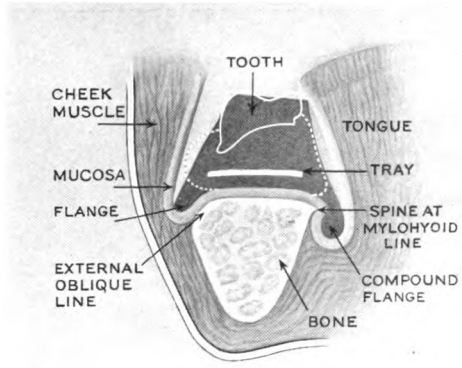

Fig. 56.

The Relation of the Lower to the Ridge

The diagram above shows a section through a flat lower jaw, the impression, the tray and the bite rim in the region of the second molar. The flanges here shown extend below the external oblique line and the mylo-hyoid line, as they are sometimes left after muscle trimming. If the plate is made with the flanges in this position, the muscles which were easily depressed in muscle trimming may prove active enough to develop considerable irritation at the point where the tissues chafe against the flange.

The buccal and lingual flanges should not extend below the level of muscle attachment at the external oblique and mylo-hyoid lines respectively unless a slight extension is necessary to develop "suction."

If the ridge is flat, it may be necessary to trim the flanges to the form of dotted outline. The impression should be trimmed so that when the finger is passed downward across its lingual surfaces the flanges will appear to be continuous with the hard tissues of the mandible at the level of the mylo-hyoid line.

When the teeth occupy the relation to the ridge shown by the dotted tooth outline, the muscular action of the cheek and tongue will balance each other and the denture will have maximum stability.

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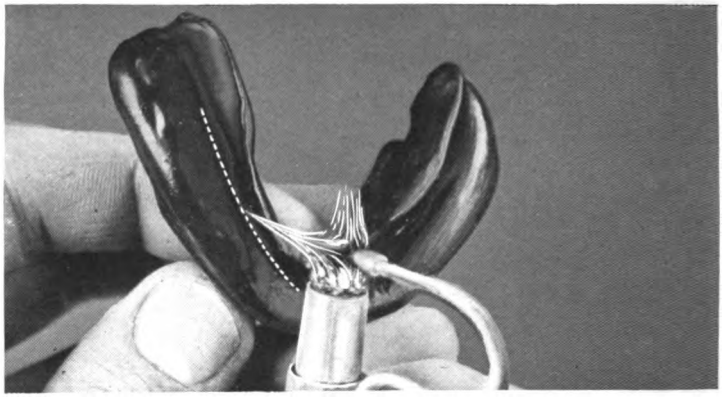

Fig. 57.

Stabilizing the Lower Impression.

The lower impression should now exhibit "suction" and be stable on the ridge against direct vertical pressure on the occlusal surface at any point between the first molar locations; or against a rocking pressure applied in the bicuspid region. If it is not stable, some error has occurred in manipulation.

Place the upper impression in the mouth. To correct the error in the lower, hold the impression as shown and direct a sharp-pointed, mouth blow-pipe alcohol flame against the compound which lies in contact with the crest of the ridge. Avoid overheating the compound or deflecting the heat against the flanges. Apply the flame first at the top of the left heel, and move it evenly along the bottom of the valley of the impression, so as to reach the other heel in about one second. Have the flame make a return trip from heel to heel. Repeat this three times. Dip the lower, thus heated, into hot water. Instantly remove it with a jerking motion and place in the mouth. Cause the patient to place the tip of the tongue in the rear of the center of the vault and close the mouth, swallow and suck, while holding the bite rims in contact. Allow the impression to harden thoroughly, remove; chill in cold water and test for stability.

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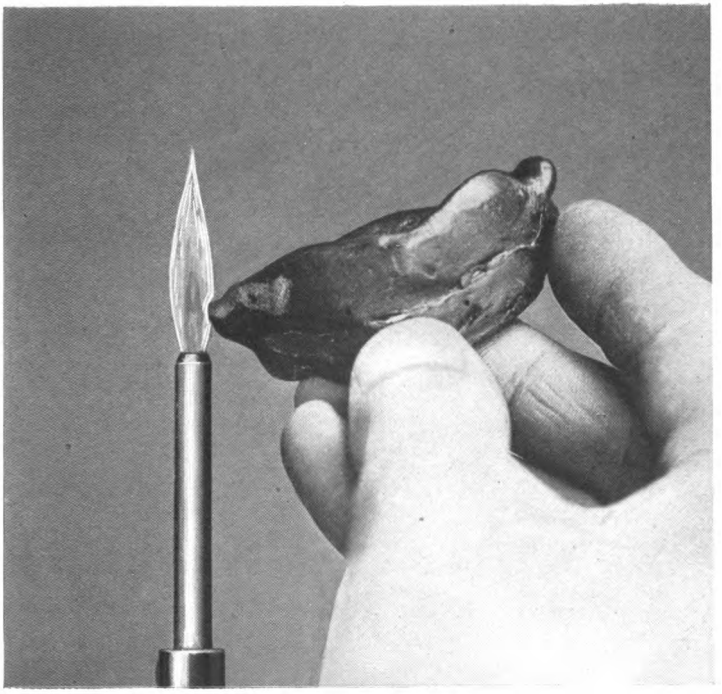

Fig. 58.

Heating the Upper Buccal Flange for Muscle Trimming.

The upper impression is to be muscle trimmed under biting pressure with the mouth closed. This is opposite to the practice for the lower, which was trimmed with the mouth open.

Hold the right buccal flange of the upper in contact with the side of the bunsen flame, near its base, as shown, with the impression tilted to the inclination shown.

Soften the edge of the flange from cuspid to tuberosity to a vertical depth of $\frac{1}{8}$ inch.

The first heating should be from heel to cuspid.

Dip in hot water, remove as quickly as possible and carry to the mouth.

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Fig. 59.

Muscle Trimming the Upper Buccal Flanges

The trimmed lower impression is in the mouth. Stand in front of the patient and place the upper impression in the mouth, left side first. Protect the softened right flange while entering, by distending the right corner of the mouth with the left index finger. Seat the impression by upward and backward pressure with the right index finger in the center of the vault. Cause the patient to close, swallow and suck with the bite rims in contact.

Soften the edge of the left buccal flange. Stand behind the patient, distend the left corner of the mouth with the left index finger, enter the impression right heel first, rotate to position and have the patient close and swallow.

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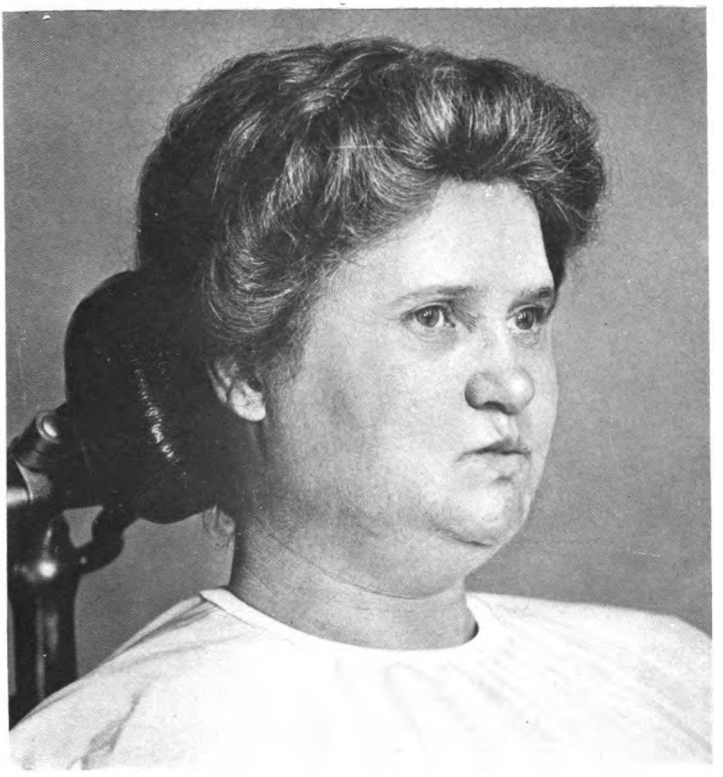

Fig. 60.

Muscle Trimming the Labial Flange of the Upper Impression, Part 1.

Heat the margin of the flange from the first bicuspid on one side to the first bicuspid on the other, using the technic described for Figure 58. Equalize the temperature in hot water, place in the mouth in the same manner as before. Cause the patient to close upon the bite rims and to throw the lips forward as here shown and backward as in Figure 61.

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Fig. 61.

Muscle Trimming the Labial Flange of the Upper Impression, Part 2.

Before causing the patient to make the forward and backward lip movements, the dentist should demonstrate these movements by performing them himself and then give the patient a mirror and cause her to practice.

It is sometimes advisable to stand behind the patient and place the index fingers on the upper lip and when the forward movement is to be made, push the lip forward, and when the backward movement is to be made, pull it back. These movements should be deliberate and rhythmical.

The result of muscle trimming is to provide a working space for the muscles in contact with the upper denture, so that ordinary movements will not destroy its stability.

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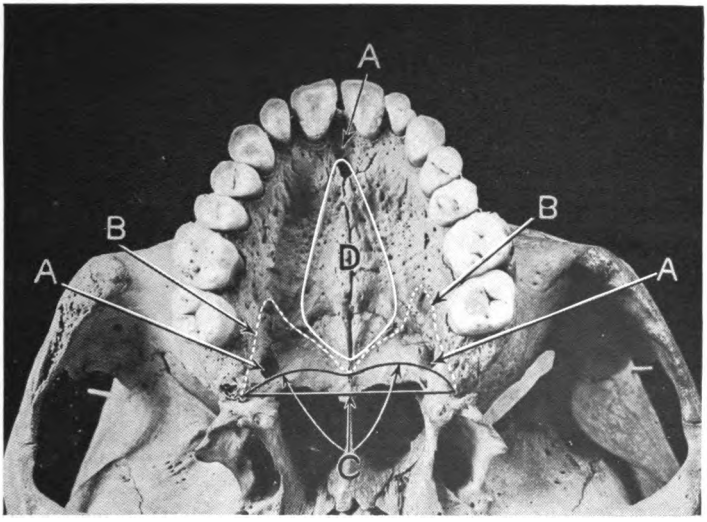

Fig. 62.

Outlining Areas for Compression and Relief.

Locate first the posterior palatine foramina, marked "AA" in this illustration. These can best be located by pressing a ball ended instrument against the tissues overlying the palatine artery commencing at the first molar, and moving it backward, with pressure upward and outward, until it fits into the depression over the foramen. Roll cotton tightly on pliers or a match, moisten it with water and wipe the mucin from the tissues in this region. With a soft indelible pencil, mark a circle about 3/16 inch in diameter, enclosing the area over the foramen. It is not uncommon for the hard palate to present a spine just posterior to the foramen. Such a spine can be detected with the ball end instrument and the area it occupies should be included within the circle. Make the same examination and mark over the opposite foramen.

To provide relief over the anterior palatine foramen, also marked "A", draw a circle about the base of the most anterior papilla of the rugae.

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The dotted lines "B-B" show how far forward the soft tissue may extend in some cases. No compression of these tissues should be made anterior to the palatine foramina nor over them, for fear of shutting off the circulation in the vessels which emerge here.

The area of soft tissues which may properly be compressed to perfect the fit of the posterior part of the denture to the vault, is bounded by the solid black line "C". Draw the crescent shaped lines "C" by starting at the bottom of the notch behind either tuberosity and moving the pencil inward and forward to the posterior margin of the circle around the palatine foramen and the spine, if present, and then to the anterior margin of the compressible soft tissue at the median line.

The hard unyielding tissues in the center of the mouth are usually located within the area marked "D". Determine the form and extent of this area in each case with the ball end instrument and mark the boundaries on the tissues.

Relief Over the Course of the Palatine Artery.

It sometimes happens that an upper impression properly taken and trimmed will have stability and fit tightly but after a minute or more will be forced out of place without muscular movement by the patient. In such cases examine the impression for air leaks at the margins. Make sure that muscle trimming is complete. When satisfied that there are no air leaks and no muscle strain, relieve the impression over the palatine foramina and along the course of the palatine artery. This usually results in the retention of the impression.

In some mouths the rami pass so close to the tuberosity, in the opening movement, that one of them may thrust the impression downward and forward. In such cases trim the impression material over the tuberosity very thin.

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Fig. 63.

Transferring Markings to Impression.

Press the dried impression against the roof of the mouth for a second or two, hold with a slight rotary motion. Remove. This should transfer to the impression the blue lines made in the mouth. Engrave these lines into the impression with a pointed instrument. It is not desirable to cut the relief at this time if records are to be taken for the Adaptable Articulator, because the creating of the proper relief might allow the impression to move slightly during lateral movements of the mandible.

Those who are not to employ that articulator and desire to make the relief now, are referred to Figure 30.

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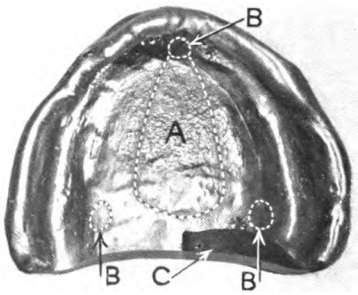

Fig. 64.

Impression Marked for Relief.

The area "A". is the location of the relief over the hard tissues of the median suture. "B" "B" "B" are located over the palatine foramina. The area "C" is that of the compressible soft tissues, over which material may be added to the impression with the idea of compressing these tissues more than they otherwise would be. The right side of this area is here shown with wax added. This is the black wax on which Trubyte teeth are carded. Roll a small portion between the fingers until it is soft and mould over the area to present a thin edge in front and a rounded edge at the rear. Have the wax thin at the median line and the tuberosities and gradually thicken to about ¾ millimeter, half way between the two.

The lower impression is in the mouth. Place the upper immediately in the mouth and cause the patient to close and swallow several times. This moulds the wax to a pressure fit with the soft tissues.

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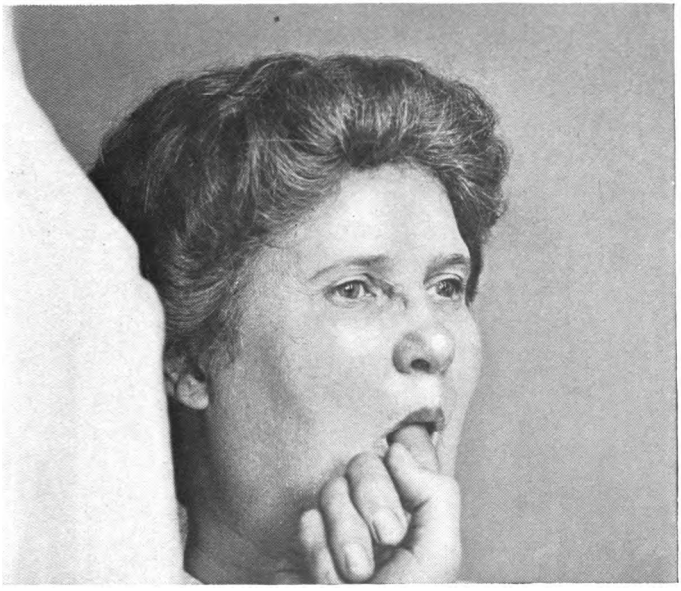

Fig. 65.

Trimming the Upper Impression at the Frenum.

Note whether a slight downward pull on the upper lip causes the frenum to pull too strongly against the flange of the impression. If it does, heat the bottom of the frenum notch to a depth of about 1/8 inch, using a mouth blowpipe and an alcohol flame. Dip in hot water, quickly place in the mouth and hold as shown and have the patient move the lip downward as illustrated.

When the ridge is very hard and the frenum active and attached near the crest of the ridge, only a slight downward lip movement is permitted, since "suction" may be lost if heating or lip action is carried too far.

Thoroughly chill the impression and test for "suction" by causing the patient to perform the lip movements in Figures 60 and 61 while pronouncing such words as "W-h-a-t".

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Fig. 66.

Perfecting Adaptation of the Upper Flange to the Ridge.

If, following the foregoing manipulation, the upper impression is stable on the ridge, but is easily dislodged by lip or cheek movements, as in pronouncing the word "when," and it is known that the posterior margin has been post-dammed so that no leak exists there, the fault will be found in imperfect adaptation of the buccal and labial flanges to the ridges. It may be corrected as follows:

Place the lower impression in the mouth. Dip the buccal flange of one side, from cuspid to heel, in water of a temperature of 115° or 120° F., for about 10 seconds, or

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until it is softened to the bending stage. Place the upper impression carefully in the mouth, entering the softened flange last, and have the patient close. By very light finger pressure directly on the flange, bend it to adaptation to the ridge and then have the patient suck. Adapt the other buccal flange in the same way.

The labial section of the flange, after softening, may be adapted by drawing the lip tightly down upon it with the thumbs, or by drawing a towel tightly across it while the patient sucks.

If muscle trimming has been properly performed, the impression should now be well retained against all lip and cheek movements.

The Heights of the Bite Rims.

It is important to the stability of the lower denture and to the patient's comfort to trim the lower bite rim to the proper fullness and height.

First trim the labial flange of the impression thin enough to prevent the lip exerting any backward pressure and forcing the impression off the ridge, a condition which causes the failure of many lowers. The flange should not be thinner than 1/16 inch, except in some recent extraction or undercut cases, where it is entirely cut away.

Trim the labial surface of the bite rim to the exact position desired for the labial surfaces of the lower anteriors. This should be such that the incisors will rest upon the ridge, rather than in front of it, and the centers of gravity of the teeth will be directly over the crest of the ridge.

Bring the occlusal surface of the lower bite rim, from cuspid to cuspid, six to eight millimeters above the crest of the lower ridge, by trimming or adding compound. If the sections from cuspids to heels are too high, soften the

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occlusal surface in the bunsen flame, dip in hot water, place in the mouth, the upper being in place, and have the patient close until the rims come together in front. If the sections from cuspids to heels are too low, add soft compound until they are a little too high and have the patient close the bite rims together in front.

To enable the patient to drink comfortably, the lower incisors must not extend above the relaxed lower lip. The lip and tongue can then easily rise above them and form a joint with the glass or cup and prevent fluid from getting between the lip and teeth. If the teeth are too high to permit forming this joint, fluid will go down inside the lip and under the plate.

Trim the upper bite rim to such a height that when the mouth is at rest there will be an open space of about 3/16 inch between the upper and lower rims in front.

When the jaw is at rest the lower teeth are out of contact with the uppers sufficiently to allow the tongue to spread between the sets and partly over the occlusal surfaces of the lower bicuspids and molars. The face exhibits its normal expression when it is at rest with the lips closed and the teeth thus out of contact. If the height of the bite rims provides for this habit, the dentures will be more comfortable and stable, the teeth will not click in speech and they will be more efficient in mastication than if the rims are so high as to prevent the teeth dropping out of contact.

To determine the height of the upper bite rim, stand in front of the patient and cause her to pronounce such words as "Mississippi" or "When". Watch the lower bite rim. If it approaches the upper to within less than 3/16 inch, trim the upper until this amount of separation is established. To do this, mark the upper rim as in Figure 30 and with a sharp knife trim to the line. Slightly soften the trimmed surface in the flame, dip in hot water, place in the mouth and have the patient close it against the lower rim. This will remove slight irregularities.

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Fig. 67.

If the separation exceeds 3/16 inch, add compound and have the patient close with biting pressure. Repeat until the desired separation is secured.

In cases where the teeth have been recently extracted, and rather rapid settling is expected, it is advisable to reduce the amount of separation between the bite rims in pronouncing these words, to 1/8 inch or less. This will cause some discomfort at first but the settling will soon produce the required space.

In Figure 67 both bite rims have been trimmed as directed above and the tongue shows in the space between them.

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Fig. 68.

Restoring Facial Expression, Part 1.

The changes in the expression of the face about the mouth following the loss of the teeth are well shown in this illustration. The upper lip has fallen backward so that its margin is actually behind the margin of the lower, which has also fallen. The corners of the mouth have sunk inward and drooped vertically.

These conditions offer dentists opportunities for the exercise of a high degree of artistic skill in making dentures which support the jaw in correct vertical position and carry the soft tissues back to approximately the positions they formerly occupied.

These conditions also offer unexcelled opportunities to interest patients in the operations involved in professional denture service.

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Fig. 69.

Restoring Facial Expression, Part 2.

If, when the impressions are in place, the expression of the lips seen full front and in profile is not pleasing, modify the labial surface of the upper bite rim. If the upper lip is not sufficiently prominent, add to the labial surface, from cuspid to cuspid, a layer of softened compound slightly in excess of the amount likely to be required. Mould it to be thicker in the median line than elsewhere, and place in the mouth while it is soft. By pressure on the outside of the lip, mould it until the lip assumes the desired contour.

The excess compound will be forced downward and should be trimmed off level with the plane of occlusion.

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Fig. 70.

Restoring Facial Expression, Part 3.

In the ideal Caucasian profile the upper lip overhangs the lower about as shown in this figure. When trimming for expression is finished, the incisal edge of the upper bite rim should project about 2½ millimeters (a little less than ⅛ inch) in advance of the incisal edge of the lower bite rim. If this projection of the upper bite rim is not sufficient to establish the profile about as here shown, add more compound.

This projection of the upper bite rim also turns the edge of the lower lip outward and assists in giving it a pleasing expression.

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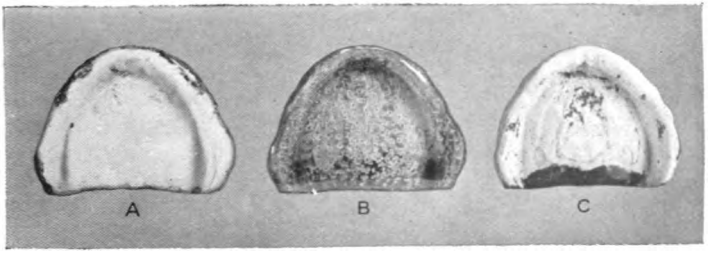

Fig. 71.

Compound-Plaster Impressions.

For dentists who feel that the use of plaster in finishing upper impressions is a short cut in time and for those who find difficulty in mastering the technic for full compound impressions, the following directions will be helpful. In many mouths in Class 2 and practically all mouths in Classes 3 and 4, the results obtained with proper compound technic are probably impossible with plaster, even when it is supported by compound, unless the soft tissues of the ridge have been surgically removed.

To use plaster for the complete upper impression to the best advantage the technic for compound impressions should be followed until muscle trimming has been completed, as described for Figure 60. After that, place the lower impression in the mouth. Coat the upper impression with a thin layer of quick setting impression plaster mixed to a creamy consistency. Place the impression in the mouth and cause the patient to hold it in position by biting pressure. When the plaster is hard, remove the impression and trim away the compound wherever it shows through the plaster. Remove all the plaster from the impression and with a tracing wheel roughen the palatal surface of the impression as shown above. Coat the roughened surface with a uniform layer of quick setting model plaster of a creamy consistency, and again place the impression in the mouth, the lower being out of the mouth.

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With a rocking motion press the upper firmly against the upper ridge and hold it there exerting pressure upward and backward upon the centre of the palate portion of the impression. When a test mass of plaster is hard, remove the impression from the mouth and immerse in cold water until it is set. Soften the occlusal surface of the upper bite rim and equalize the biting pressure by having the patient close the lower against the upper.

The outline of the areas to be relieved may be marked on the palate and transferred to the impression as they were on the compound impression. The lines may then be graven slightly in the plaster and relief established by adding thin air chamber metal to the cast before forming the base plate.

Wax may be added to the back of the impression to compress soft tissue if desired.

This method may be extended to the lower impression, but we believe it more difficult to employ it successfully than to employ the method described for compound lowers.

Plaster Upper Compound Lower.

Dentists who desire to employ full plaster impressions for upper combined with compound lowers may do so by taking an upper plaster impression and shaping a baseplate over the cast made from it and attaching a bite rim to the baseplate. Notches should be cut in the occlusal surface of this bite rim in the manner described for Figure 33. The technic for the lower may then be followed. After the lower impression is complete, the upper baseplate may be examined and its margins trimmed with a knife until the action of the muscles cannot displace it. Quick setting model plaster may then be flowed into the baseplate and a new upper impression taken, which will probably be more accurate than the first impression.

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PART II

SELECTING THE SIZE, FORM AND SHADE IN ARTIFICIAL TEETH

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Fig. 72.

Marking the Median Line.

It is important to esthetic effects to correctly locate the median line on both bite rims. This can be done by using as guides a point half-way between the eyes on the bridge of the nose and one in the center of the chin, disregarding the deflection to which the tip of the nose is subject.

Extend the median line the full width of the upper and lower bite rim and cut a notch at its upper end to preserve its location during the use of the Incisor Path Marker.

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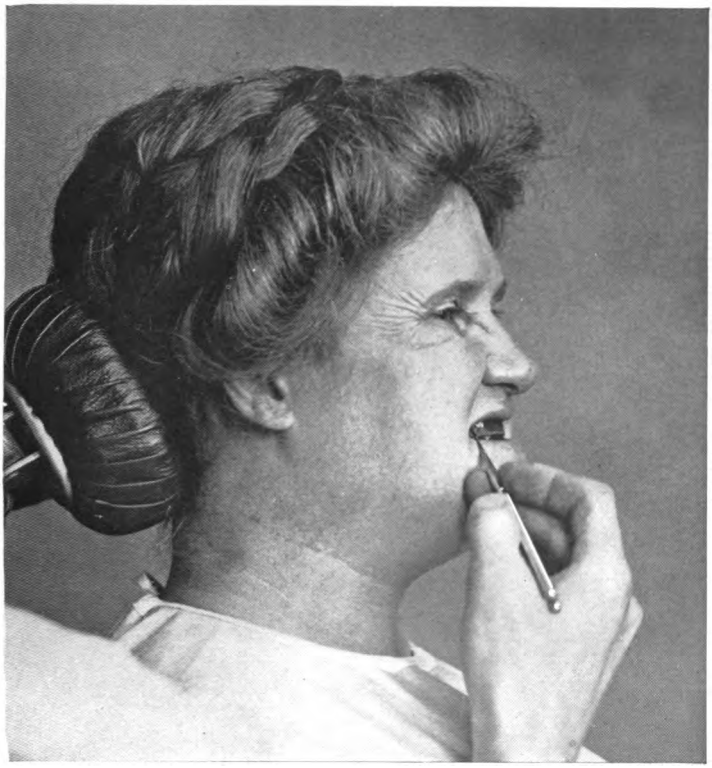

Fig. 73.

Locating the Distal Sides of the Cuspids.

There is no fixed rule for determining the positions of the cuspids which will be most pleasing. The following plan is satisfactory.

Stand at one side of the patient. With the bite rims closed together, have the patient raise the lip as high as possible in the median line and over the cuspids. Assist in the raising by lightly tapping the edge of the lip upward.

Mark the upper bite rim 3/16 inch in front of the corner of the orifice on each side, when the lip is raised as directed. These marks will satisfactorily locate the distal

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Fig. 74.

angles of the upper cuspids in any mouths save the very large and the very small. If the mouth is large and the lips thin and active, locate the marks 5/16 inch in front of the corners of the orifice. If the mouth is small and the lips inactive, locate the marks directly at the corners of the orifice.

Have the patient smile. Decide whether anteriors as wide as between the marks will appear well. If necessary, move the marks. The average person exposes all of the first bicuspids in smiling and laughing.

Make a vertical mark across both bite rims ½ inch back of the cuspid on each side.

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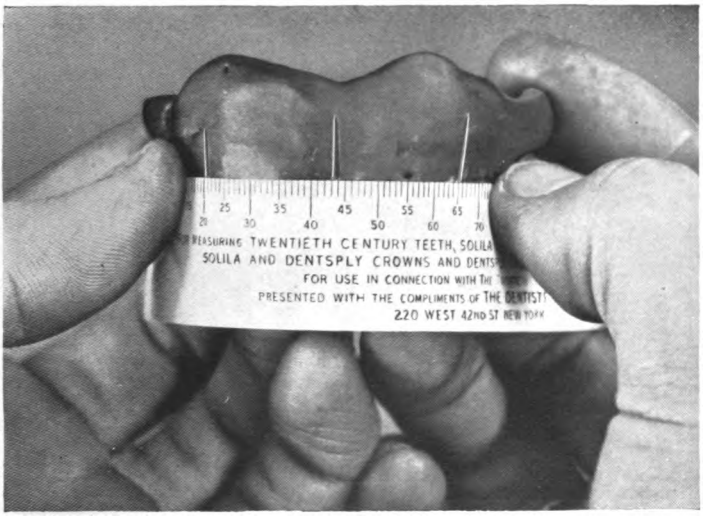

Fig. 75.

Measuring for Width of Upper Anteriors.

Remove the upper impression from the mouth and place the edge of a Twentieth Century Millimeter Measure parallel to the incisal edge and about 1/8 inch above it, as shown here. Place the 20 mm mark on the location for the right cuspid, hold the celluloid in contact with the bite from cuspid to cuspid and note the reading at the left cuspid location, and subtract 20 from it. This will give the combined width of the upper six anteriors which will set up to the fullness of the bite and bring the cuspids in correct positions. This information is of special value to the careful worker, since, when used in connection with the tables of dimensions on page 114, it facilitates rapid and satisfactory selection.

When upper and lower dentures are being made together, there is no need to take measurements of the lowers.

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Fig. 76.

Fig. 77.

HARMONY OF FORM ILLUSTRATED

The face in repose is of square form and medium proportions. The upper centrals are of similar form and proportions.

Figure 78 shows the shadow of the natural upper central, enlarged to the width of the face between the condyles and imposed on the face. It follows the facial outline perfectly.

Figure 79 shows the shadow of the Trubyte upper central indicated for the case mould 2E, which is fully as harmonious with the face as the natural central.

Fig. 78.

Fig. 79.

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Harmony of Form in Faces and Teeth.

Dr. Williams has demonstrated a striking relation between the outline forms of faces and outline forms of upper central incisors in enough cases and under enough conditions to permit the formulation of the following law: In the finest natural dentures, the outline form of the upper central is identical with the outline of certain portions of the face.

This law is capable of exhaustive proof. Select a natural denture which is pleasing when critically studied in relation to the face as in Figure 77. Photograph the upper central and enlarge it to be as wide as the face at the condyles. Impose the photograph of the tooth on a photograph of the face, with the neck of the tooth at the chin margin as in Figure 78. The photograph of the tooth will uniformly extend to the brow line, two-thirds way from the root of the nose to the normal hair line. The inverted tooth outline will follow the face outline in a striking manner.

Nature evidently desires that the outline form of the face and of the upper centrals shall be identical. She achieves this result in a comparatively small percentage of people; these furnish our finest examples and maintain our inspiration and furnish the basis for our laws. In the great majority of people the outlines of the face and teeth are approximately alike and the teeth are pleasing when not too critically studied. In some people the face outline and tooth outline are visibly unlike and the teeth are not pleasing.*

There is no relation between the color of the complexion and the outline form of the teeth, as was claimed by the temperamental theory.

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* Those desiring further illustrations of this form of proof are referred to the book, "Trubyte Teeth for Vulcanite Plates," published by The Dentists' Supply Co., and sent free on request.

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When selecting for edentulous cases, pay no attention to the form of the lost natural teeth, but select an artificial form which harmonizes with the facial outline. This will insure the selection of long teeth for long faces, short teeth for short faces, narrow teeth for narrow faces, and wide teeth for wide faces, together with the proper straightness or convexity of outline form. If the natural teeth were harmonious with the face, this method will reproduce them; if they were inharmonious, artificial teeth selected in this way will improve upon them.

Figure 79 shows a photograph of the Trubyte upper central indicated for this face, enlarged and inverted as the natural central is in Figure 78. When subjected to this, the most exhaustive test so far devised, the artificial form is seen to be quite as harmonious with the face as the natural form in Figure 78.

Trubyte teeth are offered in graded sizes and selection of the desired size can be best effected by the marks of the lip positions on the compound as already described.

The selection for both form and size can be most quickly and satisfactorily completed by the use of a Mould Guide. While a Mould Guide can be used by one who knows nothing about face forms, it can be more quickly and satisfactorily used if one will master at least the elements of face and tooth form as summarized in the following pages.

Anterior Tooth Forms In Partial Cases.

When selecting teeth for a partial case in which natural centrals remain, select a form of artificial teeth which duplicates the remaining central, without regard to the face form. If only the natural laterals remain, the central may be selected to harmonize with the face form.

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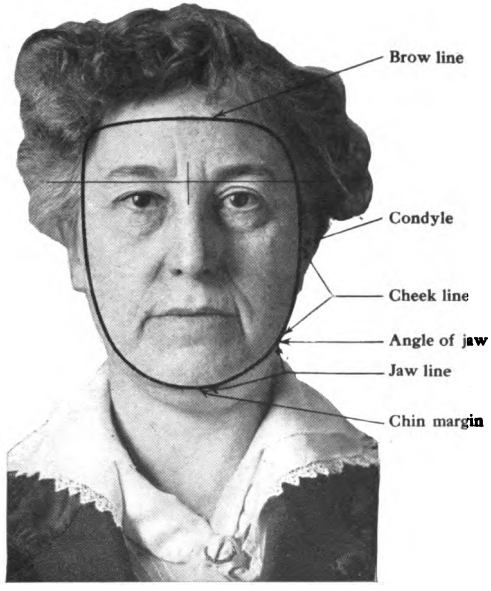

Fig. 80.

Harmony of Form in Faces and Teeth, Continued.

The continuous black outline encloses the areas of the face with which the ideal central will harmonize.

Starting with the neck of the inverted upper central at the margin of the chin, the cervical third of the tooth outline will follow the outline of the lower margin of the jaw; the outline of the middle third of the tooth will follow the outline of the cheeks; and the incisal edge will be at the brow line, about two-thirds distance from the root of the nose to the normal hair line.

Selection for full cases may be confined to the form and size of the centrals, because in properly formed teeth, they best express the character of the set and are well supported by the same character in the laterals and cuspids.

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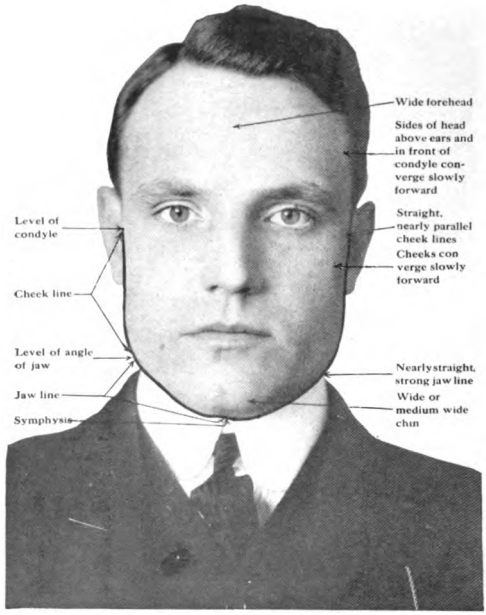

Fig. 81.

Typal Square Faces.

There are only three typal forms in faces and teeth, the typal square, illustrated and described above, the typal tapering and the typal ovoid. All other forms have been made by blendings of these three. There are thousands of such blendings, each with its individual characteristics, but if only the more important elements of form be considered, such as general outline form and proportions of width to length, there are probably not more than 15 or 16 important forms in faces and teeth. Fourteen of these have been isolated and Trubyte teeth harmonious with them have been produced. They meet the requirements of the most exacting practice.

There are five distinct forms of the square type of face. They are shown on page 107.

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Face Forms and Tooth Forms, Square Type

Fig. 82.

The Long Square

Narrow in proportion to length. Nearly straight and nearly parallel sides.

Moulds 1C—1D—1E—1F—1H.

Fig. 83.

The Medium Square

Medium proportions. Nearly straight and nearly parallel sides.

Moulds 2C—2D—2E—2F.

Fig. 84.

The Short Square

Short in proportion to length. Nearly straight and nearly parallel sides.

Moulds 3B—3C—3D.

Fig. 85.

The Intermediate Square

Wide in proportion to length and with very slightly rounding outlines. Rectangular in appearance.

Moulds 4B—4C—4E—4H.

Fig. 86.

The Oval

Long and relatively narrow. Cheek and jaw lines in long sweeping curves. Pleasing faces and beautiful teeth.

Moulds 5C—5D—5E—5F—5H.

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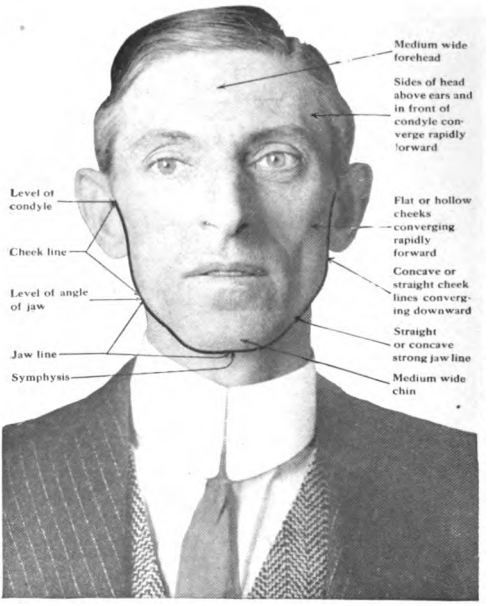

Fig. 87.

The Typal Tapering Face.

This form of face, illustrated and described above, is distinguished from the typal square and typal ovoid faces by the more rapid convergence downward of the cheek lines and their occasional concavity.

This frequently seen form of face appears to have been unrecognized in dentistry until Dr. Williams discovered it. Certainly no forms of teeth harmonious with it and its modifications and expressive of the character of tapering teeth were produced.

The five forms of the tapering type are among the most frequently seen forms of faces and teeth and certainly among the most pleasing. The faces are shown on page 109.

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Face Forms and Tooth Forms, Tapering Type

Fig. 88.

The Typal Tapering

Medium wide or more in proportion to length. Nearly straight, converging sides.

Moulds 1M—1N—1P—1R.

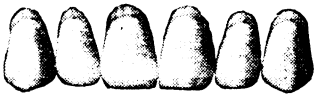
Fig. 89.

The Second Tapering

Narrower in proportion to length than the typal form. Slightly more rounding outlines.

Moulds 2M—2N—2P.

Fig. 90.



Third Tapering

Wide in proportion to length. Noticeably rounding, converging sides.

Moulds 3M—3N—3P.

Fig. 91.

Fourth Tapering

Like third tapering but narrower in proportion to length.

Moulds 4M—4N—4P.

Fig. 92.

Fifth Tapering

A combination of the medium square and typal tapering.

Moulds 5M—5N—5P—5R.

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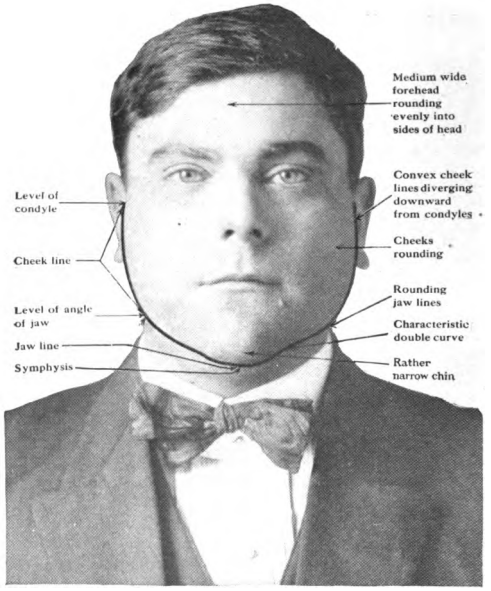

Fig. 93.

The Typal Ovoid Face.

This face is entirely unlike either of the other types, being wider in proportion to its length and bounded wholly by segments of circles. There is a characteristic double curve in the chin margin, which is reproduced, in a remarkable way, in the mesial surfaces of the upper laterals and the distal surfaces of the upper centrals.

Like the tapering type, this type appears to have been unknown to dentistry until discovered by Dr. Williams.

Faces of the four forms in this type, shown on page 111, are probably not as numerous as those of the other types, but they are often distinctive or pleasing and require suitable forms in artificial teeth.

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Face Forms and Tooth Forms, Ovoid Type

Fig. 94.

Typal Ovoid

Medium wide in proportion to length. Outlines in segments of circles.

Moulds 1W—1X—1Y.

Fig. 95.

Second Ovoid

Like the typal ovoid but narrower in proportion to length.

Moulds 2U—2X—2Y.

Fig. 96.

Third Ovoid

More than medium wide in proportion to length, with converging convex sides.

Moulds 3U—3W—3X—3Y.

Fig. 97.

Fourth Ovoid

Like the third ovoid but narrower in proportion to length.

Moulds 4U—4W—4X—4Y.

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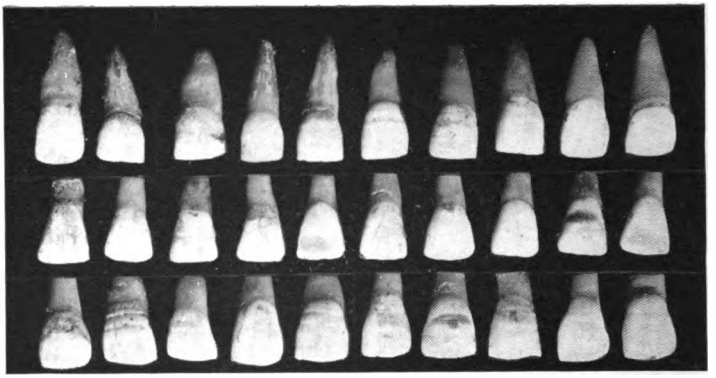

Fig. 98.

Typal Forms in Natural Teeth.

It can be shown that three typal forms of upper centrals have been common to all races from which we have even a dozen skulls showing anterior teeth, and this without relation to the time in history, the stature, the color or the intelligence of the race.

One type is square with nearly straight and nearly parallel sides; the second is tapering with nearly straight sides rapidly diverging downward; the third is ovoid with all its outlines in segments of circles.

The typal forms of teeth are so identical in outline and proportions with typal faces as to preclude any idea of rare and accidental occurrence, and to amply support the deduction of the law on pages 102 and 103. This law of identity of form holds good in fine specimens of the modifications of the typal forms.

Every other form of teeth can be shown to be a combination of these forms.

No other typal form has been found and no form which requires another type to account for it.

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Fig. 99.

Determining the Type of Face.

If straight edges are laid against the cheeks, from the condyles to the angles of the jaw, the type of face can be easily determined and the harmonious form of tooth selected. If the straight edges are nearly parallel, the face is of the square type (Class I, Trubyte classification). If the rulers converge noticeably downward, as here, the face is of the tapering type (Class II, Trubyte classification). If the rulers diverge downward from the condyles, the face is ovoid (Class III, Trubyte classification).

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Dimensions Trubyte Moulds—UPPERS

		Mould No.	Length Central Without Collar	Width 6 Anteriors Set up	Width Full 14 Set up	Combined Bite and Shut of Central	Width of Central
SQUARE TYPE CLASS I.	Form 1	1C	9.5	42.	100.	8.	6.75
		1D	10.5	46.	108.	8.	7.25
		1E	11.	48.	113.	9.	7.75
		1F	11.25	52.	117.	9.5	8.
		1H	12.25	57.	120.	9.5	8.5
	Form 2	2C	9.25	46.	108.	8.	7.25
		2D	9.75	49.	111.	8.5	7.75
		2E	10.5	50.	115.	9.5	8.
		2F	11.25	52.	127.	9.5	8.25
	Form 3	3B	8.	45.	107.	7.5	7.25
		3C	8.75	49.	111.	8.	7.75
		3D	9.5	48.	113.	8.	8.8
	Form 4	4B	8.5	47.	113.	6.5	7.5
		4C	9.25	49.	117.	7.	8.
		4E	10.	50.	118.	7.	8.25
		4H	10.25	52.	120.	7.	8.5
	Form 5	5C	9.	34.	96.	8.	6.5
		5D	9.5	37.	101.	8.	7.
		5E	10.	39.	106.	8.5	7.25
		5F	11.	48.	110.	9.	7.75
		5H	11.5	52.	117.	9.	8.5
TAPERING TYPE CLASS II.	Form 1	1M	9.	45.	107.	8.5	7.5
		1N	9.75	48.	110.	9.5	8.25
		1P	10.5	52.	117.	9.5	8.5
		1R	11.	54.	125.	9.5	8.75
	Form 2	2M	9.5	45.	107.	8.5	7.
		2N	10.	46.	108.	8.5	7.5
		2P	10.75	51.	116.	9.	8.
	Form 3	3M	9.5	45.	103.	8.5	7.
		3N	10.25	48.	110.	8.5	8.
		3P	11.	54.	125.	8.5	8.5
	Form 4	4M	9.5	44.	102.	8.5	7.25
		4N	10.5	49.	111.	9.	7.75
		4P	10.75	52.	114.	9.	8.25
	Form 5	5M	9.	45.	103.	7.5	7.25
		5N	9.5	46.	108.	7.	7.5
		5P	10.25	49.	111.	8.	8.
		5R	11.	53.	118.	8.5	8.75
OVOID TYPE CLASS III.	Form 1	1W	9.75	46.	108.	8.	7.5
		1X	10.25	48.	110.	8.	8.
		1Y	11.	52.	117.	8.	8.5
	Form 2	2U	10.	42.	100.	7.5	7.
		2X	10.25	46.	111.	8.	7.75
		2Y	10.5	48.	113.	8.	8.
	Form 3	3U	9.25	48.	110.	8.	7.5
		3W	10.	50.	115.	9.	8.
		3X	10.5	54.	119.	8.5	8.5
		3Y	11.	55.	120.	9.	9.
	Form 4	4U	9.25	46.	104.	8.	7.25
		4W	9.75	48.	110.	8.	7.75
		4X	10.5	50.	112.	8.	7.75
		4Y	11.	52.	117.	9.	8.5

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Dimensions Trubyte Moulds—LOWERS

			Mould No.	Length Central Without Collar	Width 6 Anteriors Set up	Width Full 14 Set up	Combined Bite and Shut of Central	Width of Central
SQUARE TYPE	CLASS I.	Form 1	1C	7.5	31.	95.	7.5	18.5
			1D	9.	35.	104.	9.	19.5
			1E	9.5	38.	108.	9.5	22.
			1F	9.5	39.	109.	9.	21.5
			1H	11.	49.	125.	9.75	24.5
		Form 2	2C	8.5	35.	104.	8.	19.5
			2D	9.	36.	105.	8.5	20.
			2E	9.75	38.	108.	9.	21.5
			2F	10.5	40.	110.	10.	22.5
		Form 3	3B	7.	34.	103.	7.5	19.5
			3C	8.	37.	106.	8.	21.5
			3D	8.5	39.	109.	8.	22.
		Form 4	4B	7.	36.	109.	6.	22.
			4C	8.	37.	111.	6.5	23.
			4E	8.	37.	110.	7.	22.
			4H	9.	40.	115.	7.	25.
		Form 5	5C	8.5	30.	94.	8.5	17.
			5D	8.5	33.	97.	8.	18.
			5E	8.5	34.	103.	8.5	19.
			5F	9.	35.	104.	8.5	19.
			5H	10.	42.	112.	8.	22.
TAPERING TYPE	CLASS II.	Form 1	1M	8.5	35.	104.	8.	19.
			1N	9.	38.	107.	8.5	21.5
			1P	10.	41.	111.	8.5	22.5
			1R	10.	42.5	128.5	9.5	23.
		Form 2	2M	8.	33.5	102.5	8.	19.
			2N	9.	36.	105.	9.	21.
			2P	10.	39.	109.	9.5	21.5
		Form 3	3M	8.5	34.	98.	7.5	19.
			3N	9.5	38.	107.	8.	21.
			3P	10.	42.	128.	7.5	23.
		Form 4	4M	8.5	33.5	97.5	8.	19.
			4N	9.5	37.	106.	9.	20.
			4P	10.	39.	108.	9.5	22.25
		Form 5	5M	7.5	34.	98.	7.	19.
			5N	8.	35.	104.	7.25	20.
			5P	8.5	38.	107.	8.5	21.5
			5R	9.	39.	109.	8.5	22.5
OVOID TYPE	CLASS III.	Form 1	1W	8.5	34.	103.	7.	18.75
			1X	9.	36.	105.	8.	20.5
			1Y	8.75	38.	108.	8.	22.
		Form 2	2U	8.25	32.	96.	7.5	17.5
			2X	9.50	35.	104.	8.	20.
			2Y	9.25	35.	105.	7.75	19.5
		Form 3	3U	8.	35.	104.	8.	19.75
			3W	8.5	39.	109.	8.	21.
			3X	9.5	42.	112.	9.	23.
			3Y	10.	42.	114.	9.5	23.
		Form 4	4U	8.	35.	99.	7.5	19.
			4W	8.5	37.	106.	8.5	20.
			4X	9.5	39.	108.	8.5	21.5
			4Y	9.5	39.	109.	9.	22.25

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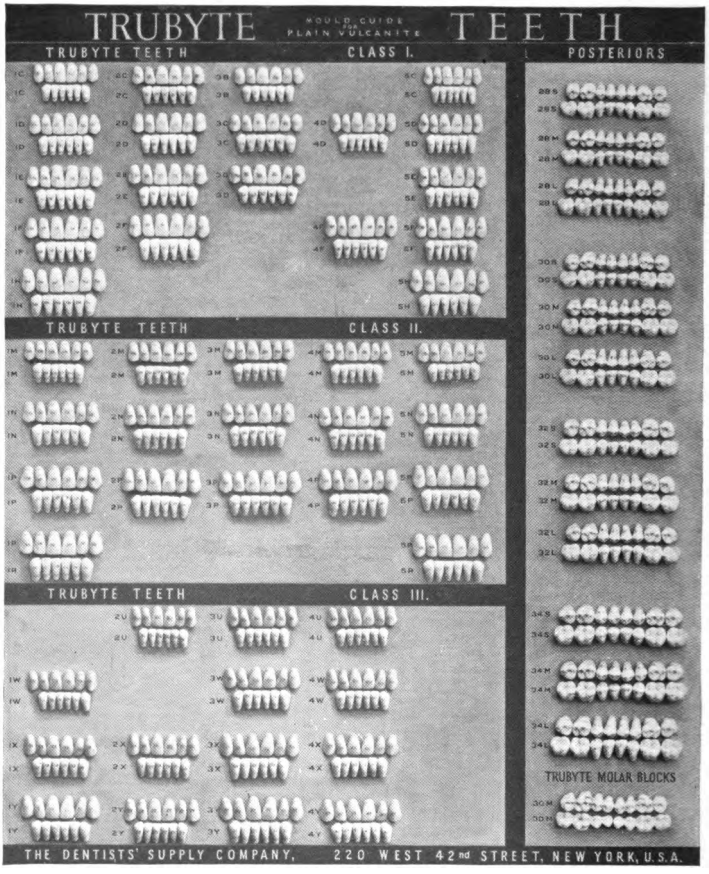

Fig. 100.

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Fig. 101.

The Use of a Mould Guide

enables the dentist to compare the outline form and proportions of the entire line of artificial upper centrals with the outline form of the face, and in connection with the Selection Rim described on page 118, to try the teeth in the mouth and observe the effect.

If the dentist is able to determine the Type and Form of the face, he can proceed to select immediately from the required type of teeth. Otherwise he may simply invert the centrals and observe which is most like the face.

In extensively modified faces, where selection is more difficult, he may compare the two or three forms available and choose the most pleasing.

He may then order teeth or select from his stock by mould number.

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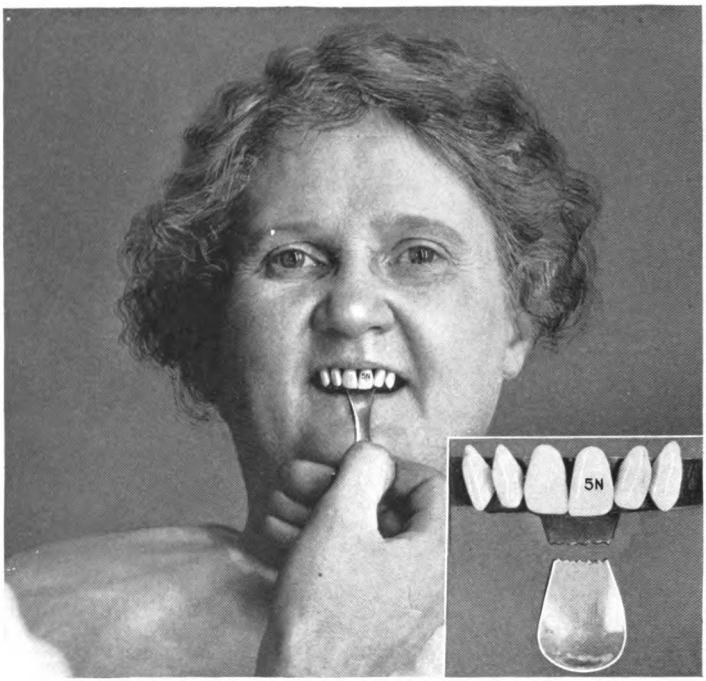

Fig. 102.

The Trubyte Selection Rim.

When the teeth have been selected, the choice should be confirmed by trying them in the mouth to judge of the harmony of form, size, and, if the desired shade is at hand, the color.

Trying-in is greatly facilitated by the use of the Selection Rim here shown in use. It is heavily nickeled and may be sterilized and filled with fresh wax for each patient.

When natural lower teeth are in place, the appearance of the uppers may be contrasted with them by mounting a roll of wax on the back of the Rim and setting it, with the teeth, immediately upon the lowers, with the uppers in the desired position.

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Fig. 103.

Shading in Artificial Teeth.

It is impossible to make natural looking dentures if the artificial anterior teeth are all of one shade, or have been shaded without a knowledge of the methods used by nature to achieve her finest esthetic effects.

In Figure 103A good natural dentures are illustrated. In Figure 103B, the same dentures are shown, but made all of one shade, as most artificial teeth are. The uniform shading makes the teeth appear larger and more prominent, especially in the back of the mouth. This effect is unavoidable with most artificial teeth.

In fine natural sets the lower anteriors are deeper in shade than the uppers. This is to emphasize the perspective. The laterals are generally a trifle darker than

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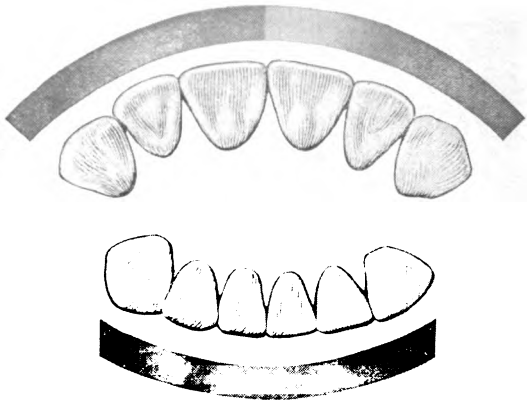

Fig. 104.

Diagram of the incisal view of upper and lower anteriors. Outside the teeth, bands of color showing the relative depths of color of the upper and lower anteriors in one fine natural set. This variation in color contributes greatly to the beauty of the teeth.

the centrals and the lower cuspids, the darkest of all the anterior teeth.

The incisal halves of the upper centrals present the lightest spot in both sets. The upper laterals are more uniform in color than the centrals and the cuspids darker still, especially at the necks. The effect of this shading is to greatly emphasize the perspective of the rounding form of the tooth row.

Artificial teeth can be esthetically successful only when the shading in a set is varied as it is in fine natural teeth. The effort to make up sets by taking different shades is only partly satisfactory because the shades are of unlike characters and were not meant to be arranged in that way.

When artificial sets are properly shaded in the set, the underbite of the lower anterior is properly emphasized, the perspective of the rounding form of the tooth row is enhanced as nature intended it to be, the band of color shown by the exposed anterior teeth is more natural in appearance, the bicuspids and molars are reduced in prominence and any slight error in selection of shade is greatly minimized.

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Suggestions for the Selection of Shades.

In a general way it may be said that the best time to select tooth colors is between 9 A. M. and 3 P. M. The lighting of the room should be good but not brilliant. Brightly colored office furnishings or decorations make accurate matching impossible. The best color for surrounding objects when matching shades is a light tone of warm gray or brown.

For edentulous patients select a color which will harmonize with the color of the skin around the orifice of the mouth. When natural teeth are in the mouth these should be matched rather than the face.

Fair or white skinned people will require much less depth of color in the tooth to balance the depth of color in the face than persons whose complexion is naturally highly modified by red or yellow or darkened by exposure to the sun or weather.

The skin of most people will be found to exhibit a surprising amount of red if examined under a separate light, through a paper tube 10 inches long and ¾ inch in diameter held to the eye to exclude side lights. For such faces teeth of suitable depth of yellow to harmonize with the face will be more satisfactory than any others.

A face with clear or brilliant red coloring will require teeth of clear yellow, while faces which have bilious, muddy yellow skin will require teeth that are a yellow muddy hue.

Red and yellow or their combinations are the basis of color of the skin of most light-skinned people.

Dentists who are not color experts, will do well to choose teeth, for edentulous patients, in which the dominant color is yellow, or yellow modified by red. Teeth in which the dominant color is blue, green or gray are very likely to produce a disharmony unless selected by an expert and in any case are rarely indicated for edentulous patients.

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A Table of the Colors in the Twentieth Century Shade Guide

Shade No. 1. Lightest shade in use. No coloring.

Shade No. 2. Trace of purple.

Shade No. 3. Trace of blue. Trace of yellow. Lightest blue.

Shade No. 4. Trace of yellow. Lightest yellow.

Shade No. 5. Trifle of gray and trace of yellow. Point same as No. 4. Neck darker.

Shade No. 6. Same as No. 4, with a little gray in the tip. Neck not so bright a yellow as No. 5. Lightest gray.

Shade No. 7. Light yellow. Darker than No. 5, with color decidedly stronger in neck.

Shade No. 8. Light yellow. Tip darker than No. 5 or No. 7. Neck lighter than No. 7, and makes tooth look a straw color. More uniform than No. 7. Yellow is the only color present.

Shade No. 9. A little yellow, a little gray, a little pink. Light brown yellow neck. Tip pink gray, follows No. 11.

Shade No. 10. Gray. Lighter than No. 9. Darker than No. 6.

Shade No. 11. Uniform gray throughout. Neck grayish yellow slightly darker than 10, which it follows.

Shade No. 12. Grayish blue. Follows No. 3 in the blues.

Shade No. 13. Grayish blue. Follows No. 9.

Shade No. 14. Yellowish gray. Gray yellow neck. Follows No. 13.

Shade No. 15. Pinkish gray. Decidedly darker and shows more pink than No. 9. The other grays are bluish grays. This follows No. 14.

Shade No. 16. Yellow. Follows No. 8.

Shade No. 17. Greenish yellow. Green tip and yellow neck.

Shade No. 18. Dark yellowish gray. Follows No. 14.

Shade No. 19. Dark greenish yellow. Follows No. 17.

Shade No. 20. Brownish yellow. Follows No. 16.

Shade No. 21. Dark brown yellow. Follows No. 20, which it is like, only darker.

Shade No. 22. Dark gray. Follows No. 18.

Shade No. 23. Darkest brown yellow. Follows No. 21.

Shade No. 24. Dark grayish brown. Follows No. 22.

Shade No. 25. Dark yellowish brown. Follows No. 23.

Shades in order of depth from light to dark.

Light Shades, 1-2. Yellows, 4-5-7-8-16-17-19-20-21-23-25. Grays, 6-10-11-9-13-14-15-18-2-24. Blues, 3-12.

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Surface Texture and Tooth Shades.

Dentists who wish to make fine prosthetic restorations should avoid using teeth with such smooth labial surfaces that they look glassy. While the labial surfaces of many natural teeth have been worn smooth by lip action, the finest teeth present labial surfaces with slight irregularities, as though the enamel had been deposited in waves. These irregularities diffuse the light reflected by the teeth and soften both the high lights and the shadows. The result is that the entire tooth has a soft and pleasing color.

The artificial teeth of the past have presented either very smooth labial surfaces or depressions like those resulting from defective calcification. The smooth surfaces have collected light rather than diffused it and have exhibited small, localized strong high lights and deep shadows. The high lights being brighter than the color of the tooth, and the shadows deeper than that color, have made it impossible, in certain cases or certain lights, to place artificial teeth beside natural teeth and have them indistinguishable, however carefully the shade was chosen.

When Trubyte teeth were produced, this subject of diffusion of light was given very careful consideration, and after much experimenting to develop a method of mould-making which permitted the production of labial surfaces with satisfactory irregularities to diffuse the light, Trubyte teeth were brought out with such surfaces.

Three of the great factors in shade selection are thus placed in a favorable position before the dentist, satisfactory shades from which to select; a variation of shade in the set and between uppers and lowers which achieves the proper perspectives; and tooth surfaces which diffuse the light as do the finest natural teeth.

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Part III

Measuring Habitual Masticating Movements

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Why It Is Worth While to Reproduce Jaw Movements.

Because if the dentist can foresee the conditions under which the dentures will operate in any mouth, he can achieve stability, comfort and efficiency in those dentures.

It is probable that the permanent natural teeth determine the habitual movements of the jaw, and there can be no question that these movements determine the bony formations in the fossae and condyles and often alter them extensively.

The natural teeth are rarely lost all at once or evenly on both sides or both jaws. With the uneven loss of teeth the jaw movements on the two sides change, sometimes in great degree. The jaw is often incapable of movements on one side which it habitually performs on the other.

When all the natural teeth are lost, the only guides as to what the habitual movements were, are the records of the habitual jaw movements. If these can be recorded and reproduced in an articulator, the teeth can be so arranged that when they are placed in the mouth, the jaw can go right on with the movements to which it is accustomed, the dentures will not be dislodged, and the teeth will oppose each other in the manner essential to trituration.

Any other course requires the adoption of an arbitrary set of movements for the jaw, the arrangement of teeth to harmonize with them, and the effort to force the jaw to adopt the arbitrary movements, with the necessary changes in bony formation and muscular action, which in advanced age is impossible.

"Custom-made" dentures, that is, those made to fit the individual patient as clothes fit the individual form, are so much more satisfactory to patients and dentists as to fully justify the necessary procedure.

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Interferences that Prevent Correct Records.

It is impossible to take correct records of the habitual jaw movements, if the heel of either impression is so bulky as to interfere with natural free movements of the jaw.

If the impression material over the upward inclines of the lower ridge is too thick, it may come into contact with the material over the tuberosities of the upper jaw which may also be too bulky. These improper contacts may cause pain. The patient should be instructed to report even slight sensations of pain or any feeling that the free movement of the mandible is hindered.

To relieve such contacts, trim the bite rim or impressions as thin as may be necessary but without cutting through the impressions or altering their margins. It is often necessary to cut away portions of the tray.

If the impression cannot be trimmed thin enough to avoid interference, adjust the Condyle Path Register as described for Figure 124. Lock the bites together by the method described for Figure 126, remove them from the mouth and dismiss the patient. Pour casts and mount them in the articulator, using the technic given.

Remove the upper impression from the cast, leaving the lower in place. Make a baseplate of Dentsply Base Plate Composition for the upper. Make a compound bite rim on this baseplate and fit it to the flat surface of the Horseshoe Plate, with the incisor guide pin in place. In the same manner remove the lower impression and adapt a baseplate to the lower ridge, make a compound bite rim and fit it to the upper bite rim.

Attach the Horseshoe Plate to the block on the Condyle Path Register, open the articulator and allow the Horseshoe Plate to move on the top of the lower bite rim and bring the points of the horizontal pencils to be opposite the heads of the condyle pins. Then press down on the Horseshoe Plate so as to make an imprint of its pins on

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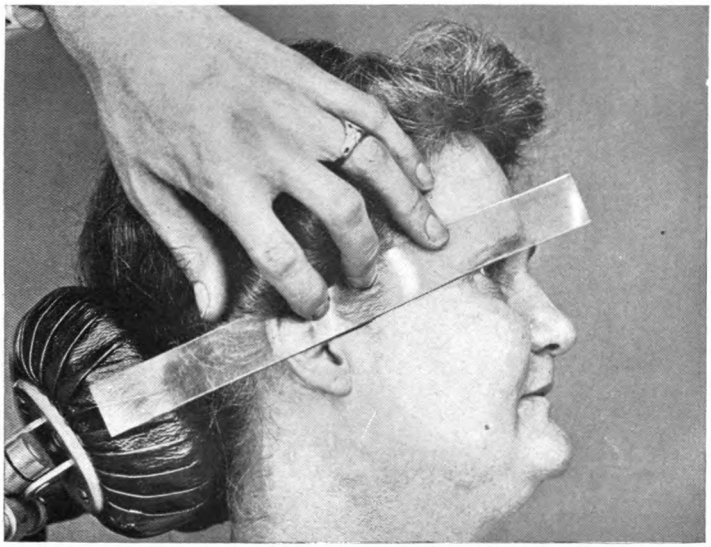

Fig. 106.

Locating the Heads of the Condyles.

It is essential to that technic which follows that the location of the centers of the heads of the condyles should be indicated upon the face in such way that the Condyle Path Register or the Snow Face Bow can be properly adjusted.

These locations can be most easily made by the use of a flexible ruler which should be placed against the side of the face so that its lower border extends from the upper margin of the external auditory meatus to the outer corner of the eye, as shown above. With an Eastman negative retouching pencil or a soft lead pencil, draw a line forward along the lower border of the ruler for about ¾ of an inch from the anterior margin of the meatus. Draw a line vertically across this one about ½ inch from the anterior margin of the meatus. The intersection of these lines will usually locate the center of the head of the condyle. Mark the location of the center of the head of the other condyle in the same way.

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Fig. 106A.

Locating the Horseshoe Plate, Part II.

Release the hold upon the Condyle Path Register. Stand in front of the patient and part the lips, see that about ½ inch of the Horseshoe Plate is visible and note whether the points of the recording pencils can be adjusted to reach the crosses made over the centers of the heads of the condyles.

If the relations are found to be satisfactory, instruct the patient to bite forcibly on the Horseshoe Plate and force the pins on its under surface into the bite rim. The impressions the pins make will be used later to correctly locate the Horseshoe Plate for attaching the bite rim.

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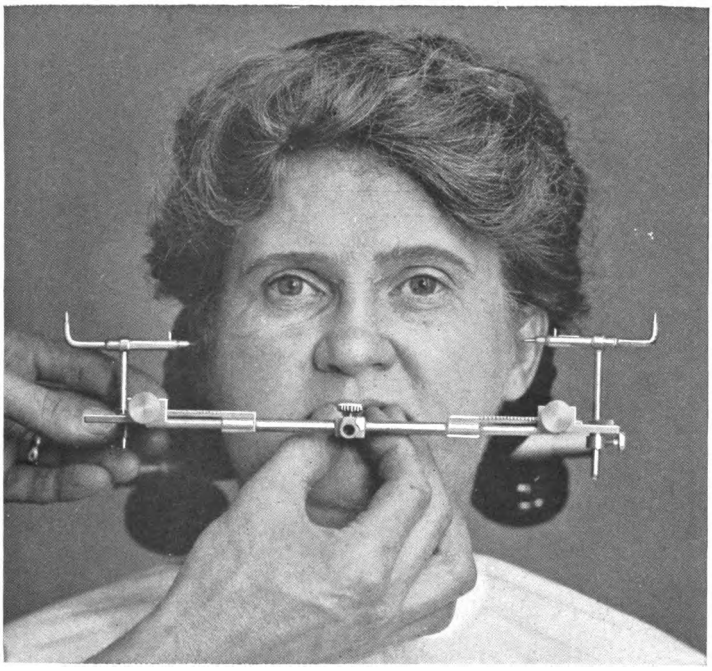

Fig. 107.

Withdrawing the Condyle Path Register.

Support the distal end of the right wing of the Condyle Path Register with the left hand. Place the thumb and two fingers of the right hand on opposite sides of the anterior part of the Horseshoe Plate and pinch the thumb and fingers together so that they will slide forward on the converging margins of the plate. If this pressure is continued after the thumb and fingers come into contact with the center block of the Condyle Path Register, this block will be forced off the Horseshoe Plate without discomfort to the patient.

Lay the Condyle Path Register aside and remove the upper impression, and the lower impression with the Horseshoe Plate attached.

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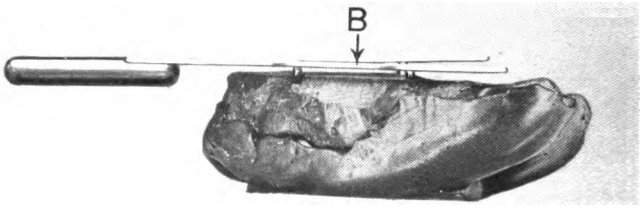

Fig. 108.

Attaching the Horseshoe Plate to the Bite Rim.

Dry the occlusal surface of the lower bite rim and all of the Horseshoe Plate. Seat the pins of both sides of the Horseshoe Plate in the imprints in the occlusal surface of the bite rim, as here shown. Direct a mouth blow pipe flame from an alcohol lamp on the occlusal surface of the Horseshoe Plate at the point "B," and heat carefully until the pins can be pressed all the way down. Do not overheat or the plate may sink into the bite rim and destroy the plane of occlusion.

Partly chill the side on which the pins are down and heat the opposite side and press the pins down in like manner. Thoroughly chill the entire rim.

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Fig. 109.

Equalizing Biting Strain on the Bite Rims.

The seating of the Horseshoe Plate may have destroyed the equal biting stress on the opposite sides of the bite rims. Heat the occlusal surface of the upper bite rim with a mouth blow pipe flame from an alcohol lamp to a depth of about 1/32 of an inch. Equalize the temperature in hot water, place in the mouth, the lower impression and Horseshoe Plate being in position, and cause the patient to touch the tip of the tongue to the centre of the back of the hard palate, close and swallow. When the upper bite rim is hard, remove it and trim the margins of the occlusal surface until it shows no imprints of the edges of the Horseshoe Plate.

If the biting pressure is equal all around, it will be possible for the patient to snap the rims together with a sharp, definite sound. Unequal pressure will cause a muffled, prolonged sound.

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Fig. 110.

Adjusting the Horizontal Pencils.

Smear the occlusal surface of the Horseshoe Plate with cocoa butter. Replace the central block of the Face Bow on the projecting pins of the Horseshoe Plate, so that the block touches the point of the plate. Move the right wing of the Condyle Path Register until the point of the horizontal pencil touches the face. Loosen the lock nut and move the horizontal pencil of one side until its point is at the intersection of the lines over the head of the condyle. Lock the pencil in this position. Adjust the other pencil.

Special care must be used to lock the pencil holders firmly or they may move slightly and confuse the records.

Move the wings outward until the points of the pencils are about ¼ inch from the face.

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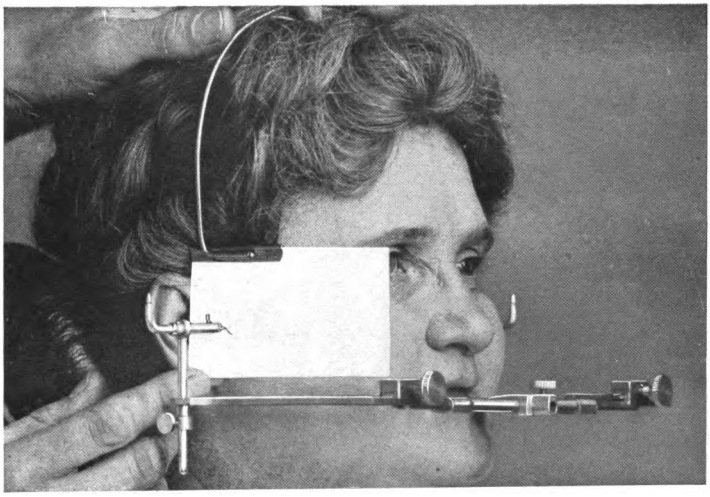

Fig. 111.

Registering the Descending Inclination of the Condyle Path.

A device suggested by Dr. Zurbrigg is very convenient for holding the card in recording the descending inclination of the condyle paths. It consists of two card holders and a connecting wire. Each card holder is made by folding a sheet of brass and soldering a sleeve on one side of the fold. Platinoid wire of sufficient length to go over the head as shown is bent near the ends to fit into the sleeves.

Insert a card into the right holder and support it as shown so that its lower margin parallels the wing of the Condyle Path Register. Move the wing of the Condyle Path Register toward the face until the pencil presses against the card with light spring pressure. Place the finger against the card, just in front of the upper part of the ear, and hold it firmly against the face.

Cause the patient to move the jaw from right to left with the bite rims lightly in contact. The pencil records the descending inclination of the condyle path habitual to the patient. Make records for both sides.

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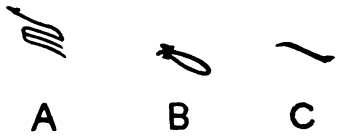

Fig. 112.

Correct and Incorrect Descending Inclination Record.

If the record of the descending inclination exhibits several parallel lines, as shown at "A" it is probable that the card has been gradually raised by the operator while the record was being made. If the record is of the character shown at "B" the patient is probably dropping the jaw slightly as it moves from side to side, or there may be interference between material of the upper and lower impression or between the upper impression and the ramus. This causes the lower impression to tip a little and the Condyle Path Register and the recording pencil tip with it resulting in the characteristic marks here shown.

When the pencil starts from the point of rest and makes a forward and return movement in the same path as at "C", the record is accurate.

If any doubt exists as to the accuracy of the records, raise the card half an inch, keeping its lower margin parallel to the wing of the register, and make a duplicate record. This may be done a third time if desired. Remove the register as described for Figure 107.

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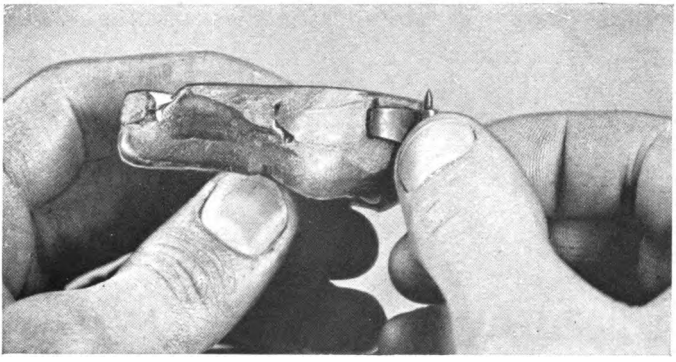

Fig. 113.

Attaching the Incisor Path Marker to the Impression.

Invert the upper impression and hold as shown. Hold the incisor path marker with the pin released between the thumb and finger and heat the points of the pins in the flame, but not until the marker becomes uncomfortable to hold. Press the points of the pins against the labial surface of the upper impression so that the recording point and its holder will be in the median line. Reheat the pins and attach the marker firmly in position.

The vertical position of the marker should be such that when the spring governing the marking point is released, only the cone of the marker projects below the level of the incisal edge when the bite rim is in the proper position.

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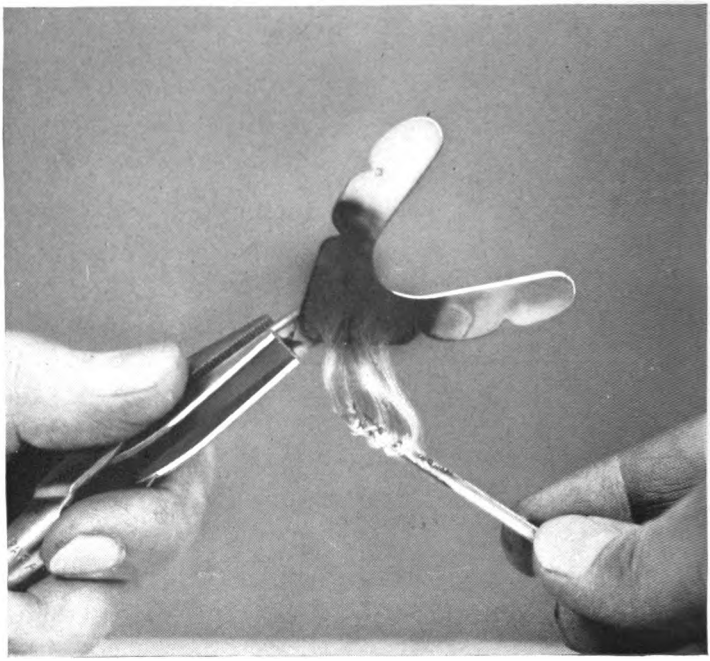

Fig. 114.

Blackening the Horseshoe Plate.

Roll cotton on the end of a toothpick or match, dip in oil of cloves, light it, and with the smoke blacken the anterior part of the occlusal surface of the Horseshoe Plate.

Lay a ball of Dentsply Base Plate Wax about 1/16 inch in diameter at the point of the Horseshoe Plate and with a very hot and clean spatula, or a mouth blow pipe flame, flow it over the black surface as far back as the first notch on each side. This wax film is merely a protection for the lampblack and should be as thin as possible.

Wipe away the uncovered lampblack.

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Fig. 115.

Taking the Incisor Path Record.

Lock the pin of the Incisor Path Marker in the raised position. Place the upper and lower impressions in the mouth. Release the pin and have the patient move the jaw from side to side with the bite rims lightly in contact about a dozen times, and then move from front to back. These movements should cut the wax from a well defined V shaped area, with a pointed front.

If the record does not present a sharp point, an abnormal habit of holding the jaw may be suspected. Patients long without posterior teeth may hold the jaw forward of the normal rest position. A correct record may usually be had from such patients by causing them to open the mouth, touch the tip of the tongue to the rear of the center of the vault and close with the tongue in that position, and then move the jaw to one side and hold. Repeat the opening, the tongue placing, and the closing, and have the patient move to the other side. Repeat several times.

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Correct and Incisor Path Records.

(Illustrations on page following.)

If the lower jaw is protruded during record taking so that the condyles are forward of their normal position for mastication, the marker will trace an indefinite path, with a rounded point, like that shown at "A" in Figure 116. Such a record is incorrect and of no value.

Normal masticating movements give the sharp pointed form of record shown in "B" and "C." We believe that if there is no movement of the impressions during record taking, there is no exception to this statement. When the lower jaw is very flat, hold the lower impression in place during record taking.

The record in "B" shows the usual extent of movement. That in "C" is from a patient with unusually extensive lateral and protrusive movements.

If the record on one side of the median line is much shorter than on the other, examine the upper impression over the tuberosities on the side opposite the short record. It may be that the impression in this region is so thick that it interferes with the free movement of the jaw. See the reference to this subject on page 126.

Incisor path records are important not only for making possible the reproduction of the individual jaw movements in the articulator, but they constitute the only exact method of determining when the lower jaw is in correct relation to the upper for locking the bite rims together. When the lower jaw is at rest with the point of the marker at the apex of a record as at "D," Figure 116, the upper and lower bites are in correct antero-posterior and lateral relations.

If, when the jaw is at rest, the point of the marker touches the record at "E" the bites are in correct lateral relations, but the jaw is protruded.

If, with the jaw at rest, the point of the marker is at "F," the bites are in correct antero-posterior relations but incorrect lateral relations.

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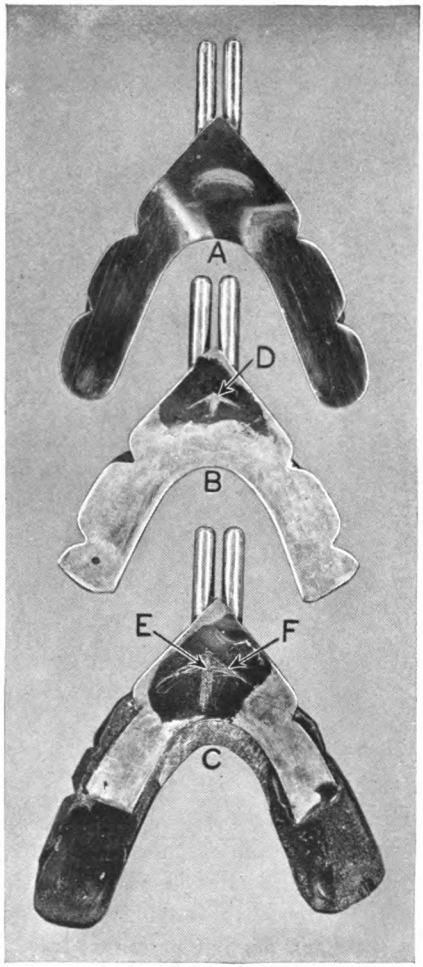

Fig. 116.

Correct and Incorrect Incisor Path Records.

Dentists will do well to learn to look on this record as a picture which shows whether the bite plates are in correct relation. Lock the marking pin in the raised position.

For a description of these records and their significance, see the preceding page.

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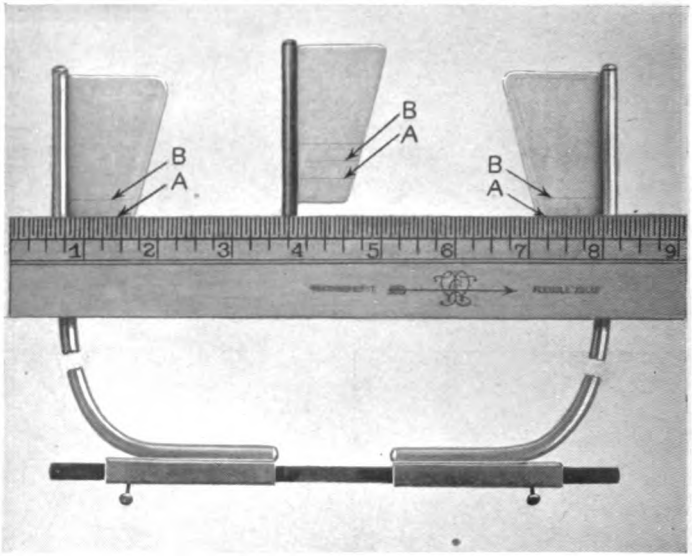

Fig. 117.

Drawing Base Lines for the Lateral Inclination Records.

Lay the Lateral Path Register on the bench with the ground glass side upward. Place a rule across both glasses as shown. Hold it in one position and draw the line shown at "A" about ¼ inch from the narrow end of the glasses. The line on one glass is a continuation of that on the other and both lines are approximately parallel to the square bar at the back of the register.

About ¼ inch from the line "A" toward the wide ends of the glasses, draw the line "B," parallel to the line "A."

These lines are to serve as starting points from which to make records for determining the lateral inclination of the condyle path and are called base lines.

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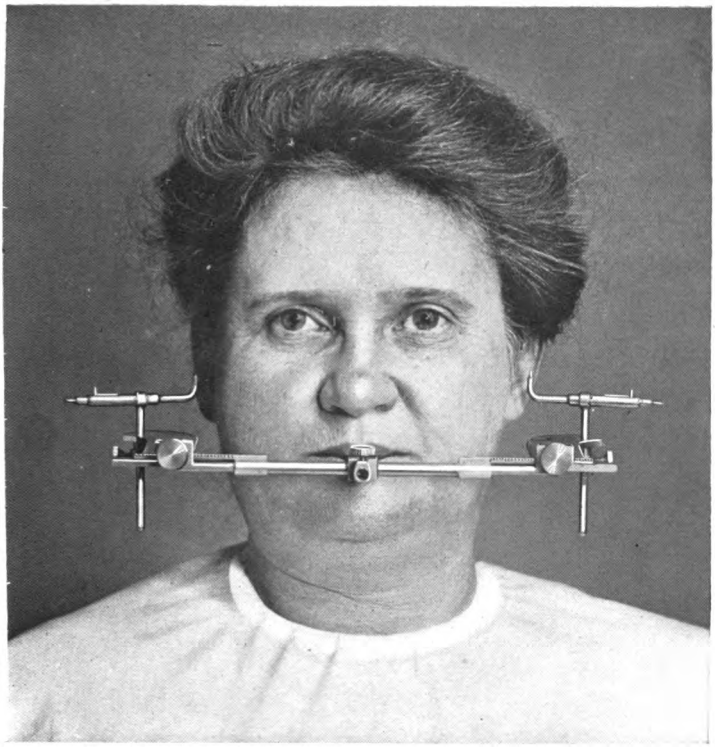

Fig. 118.

Adjusting the Vertical Pencils.

Place the Condyle Path Register in position on the Horseshoe Plate. Loosen the lock nut holding the recording pencil on one side. Turn the vertical pencil toward the face. Move the wing of the Condyle Path Register inward until the point of the vertical pencil is level with and opposite the intersection of the lines over the head of the condyle. Lock the pencil so firmly in position that it cannot be moved during record taking. Adjust the pencil on the opposite side in the same way. Move the wings of the Condyle Path Register outward until the vertical pencils are about ½ inch from the face, as here shown.

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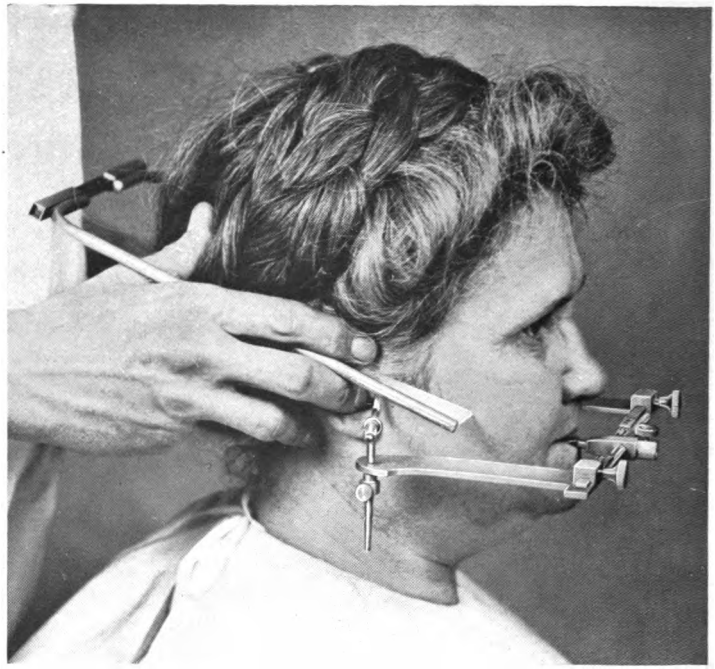

Fig. 119.

Holding the Lateral Path Register, Part I.

Have the patient sit on a low stool or depress the chair and drop the headrest. Stand directly behind the patient with the arms free from the body. Grasp the Register with both hands as here shown and carry it from above downward and backward about the head until the glasses are above the points of the pencils but not in contact with them. Place the ends of the second fingers in the external auditory canals. The arms of the Register should rest across the bases of the thumbs and the outer joints of the middle fingers. The index fingers rest on top of the arms of the Register with just enough pressure to prevent the Register slipping forward. The third fingers rest on the base of the skull and the thumbs are placed as shown.

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Fig. 120.

Holding the Lateral Path Register, Part II.

Hold the Register as described and bring the two posterior base lines in contact with the points of the pencils. Slope the glasses downward and forward at about the same inclination as the tracings of the descending inclination of the condyle paths. The glasses should "float" upon the pencil points so that they may follow any change in elevation of the pencils as they move. If the glasses rest heavily on the pencils during the movement, the leverage may be sufficient to dislodge the lower impression from the ridge and give incorrect records.

Patients show a strong tendency to move the head during the taking of this record. Do not try to hold the head still; instruct the patient to resist this tendency and poise the hands and Register so that they may move with the head as nearly as possible. It is sometimes advantageous to have an assistant hold the lower impression firmly in place while this record is made.

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Fig. 121.

Recording the Lateral Inclination.

Instruct the patient to keep the bite rims in contact with very light pressure and move the jaw slowly, first to the right and then to the left. This movement to the right should make a long tracing on the left glass in front of the base line which slopes downward and inward as here shown, and a shorter tracing on the right glass continued back of the base line, either as a continuation of the forward inclination on that side or with a different slant, and vice versa.

Both lateral records are taken at the same time, while one descending inclination is recorded at a time.

The pencils must start on the base line and finish on the base line with the jaw in the rest position. Any other position of the pencils with the jaw at rest indicates that the Lateral Path Register has moved and that the record is valueless. Other records may be taken starting at the base lines in front of the two just used.

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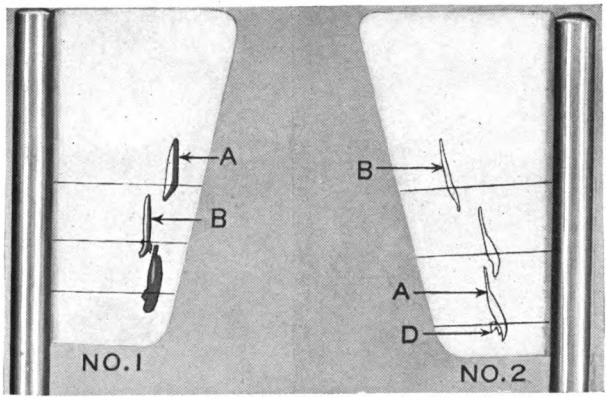

Fig. 122.

Correct and Incorrect Lateral Paths.

A lateral path record which is incorrect in two important particulars is shown at "A" in Number 2. The register moved enough during the taking of the record so that when the jaw was returned to a position of rest the pencil was at "D" instead of on the base line. The loop in the record shows that the patient made the record with jaw protruded, or that the lower impression moved on the ridge, perhaps because the glasses pressed too heavily on the pencils or the lower impression was not stable on the ridge, or because of an interference described on page 127. Discard such a record and make a new one.

The loop at "A," Number 1, shows that the patient protruded the jaw during at least one cycle of jaw movement.

At "B" in Number 1 is shown a good record from a patient who has worn artificial dentures for a long time. Control of the jaw movements has been lost to such an extent that the pencil did not move continuously in the same line, but moved in parallel lines.

At "B" in Number 2 is shown a correct record from a patient who has recently lost the natural teeth and whose jaw movements have not become indefinite as a result of wearing improperly made dentures.

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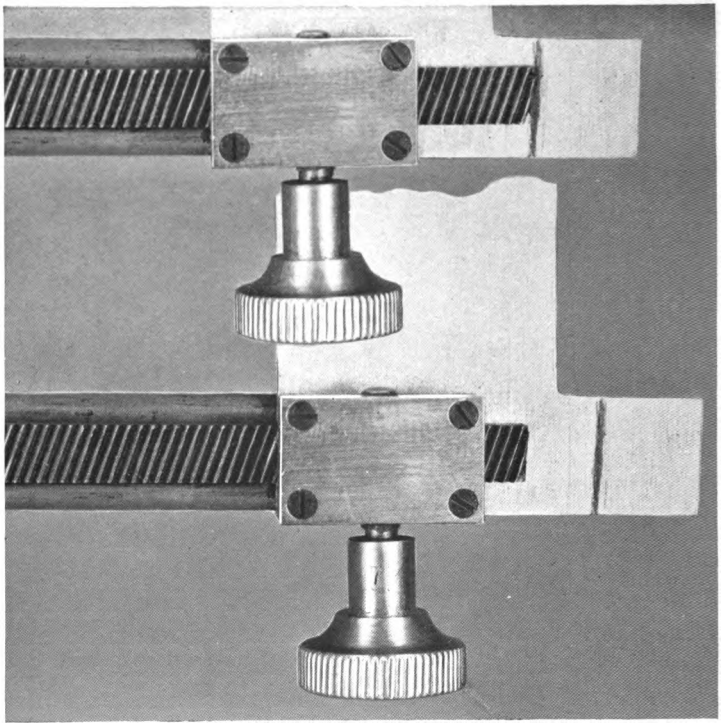

Fig. 123.

Adjusting the Condyle Path Register and Removal.

Make sure that the point of the incisor path marker pin is at the point of the incisor path tracing.

Return the points of the horizontal pencils to the position in Figure 106A, in contact with the tissues over the condyles, and lock them firmly in position so that they cannot be disturbed during subsequent manipulation.

With an Eastman negative retouching pencil make a mark on each wing of the face bow directly at the end of the milled tract, while the pencils are in position as shown.

Move both wings away from the face so that the pencils will "clear" and remove the face bow from the Horseshoe Plate in the manner described for Figure 107.

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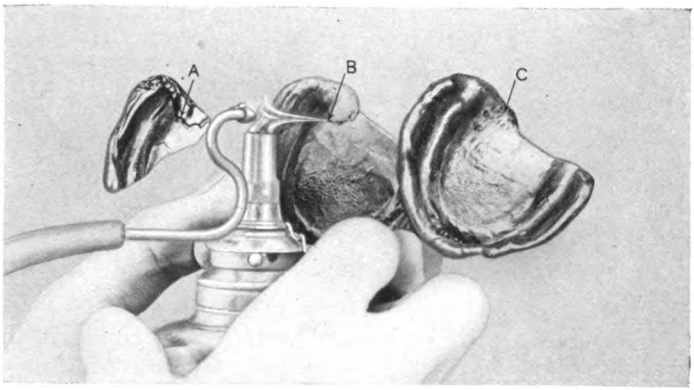

Fig. 124.

Correcting Lack of Fit in the Impression.

Heat the end of a tracing stick in the bunsen flame until it becomes almost fluid. Trace the softened compound on the area of the impression which is defective as shown at "A." Dip this section of the impression quickly into hot water, remove, seal the impression on the ridge and chill the compound in position until it is set.

While a little moisture remains on the palatal surface of the impression, direct a mouth blowpipe flame from an alcohol lamp against the margin of the added compound and the adjacent area of the impression as shown at "B." Heat this area to a flowing stage as quickly as possible without burning the compound. Dip the impression in hot water, quickly remove and place in position in the mouth. When the compound is set, remove. With a sharp knife trim away the compound which projects beyond the margin as originally determined, as shown at "C."

A second method of correcting errors due to lack of impression material in the base impression is as follows: Have the lower impression in place in the mouth. Heat the end of a tracing stick till fluid and add a sufficient amount of compound to the defective portion of the impression to fill up the defect. Chill the impression and

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addition in cold water. Heat the added material and the surface of the impression adjacent to it with the mouth blowpipe flame and reduce the temperature of the hot material by immersing in the hot water and instantly removing it. Place the impression in the mouth, have the patient close and suck. Chill the impression thoroughly in place and remove.

This method will usually yield satisfactory results at the first insertion.

The marginal flanges of the upper impression are sometimes deficient in adaptation, due to difficulty encountered in carrying the material above the tuberosity to a proper height while taking the base impression. Other portions of the margins of the flanges are also subject to faulty adaptation if the impression material was too cold when the base impression was taken. Defects such as this may be corrected by making additions of compound to the imperfect portion of the impression with a tracing stick.

In using the tracing stick for the first technic given, care must be exercised to use all the speed possible in the operation after the hot material is added to the impression. If much time elapses between the tracing of the hot material on the flange and the final placing and seating of the impression on the ridge, the flange will absorb heat from the tracing and become sufficiently softened to bend in the process of seating the impression creating another type of error difficult both to detect and correct and frequently serious enough to make necessary the repetition of steps of impression taking up to the point where the tracing commenced.

The first technic that follows is usually employed when retention is defective before the bite rim is added to the lower; the second is used after the bite rims are built on the impression.

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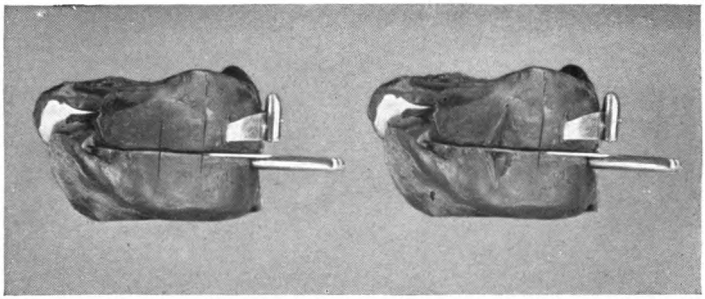

Fig. 125.

Preparing the Bite Rims for Locking.

Smooth the buccal surfaces of the upper and lower bite rims for an inch back of the cuspids, on both sides, so that there are no undercuts or indentations. If any traces of the notches cut on the occlusal surfaces of the upper bite rims remain, fill them.

Deepen the vertical lines made across the buccal surfaces of both bite rims, ½ inch back of the cuspids, into irregular V-shaped notches as shown above. Cut two rectangular pieces of 30-gauge brass or aluminum about ½ x ¾ inch, and bend a little of one of the long edges of each at right angles to the rest of the surface, to serve as handles. The side of each piece opposite to the handle is to be covered with soft compound from the heater to a depth of from ⅛ to ¼ inch.

The rectangles are called "Bite Lock Trays."

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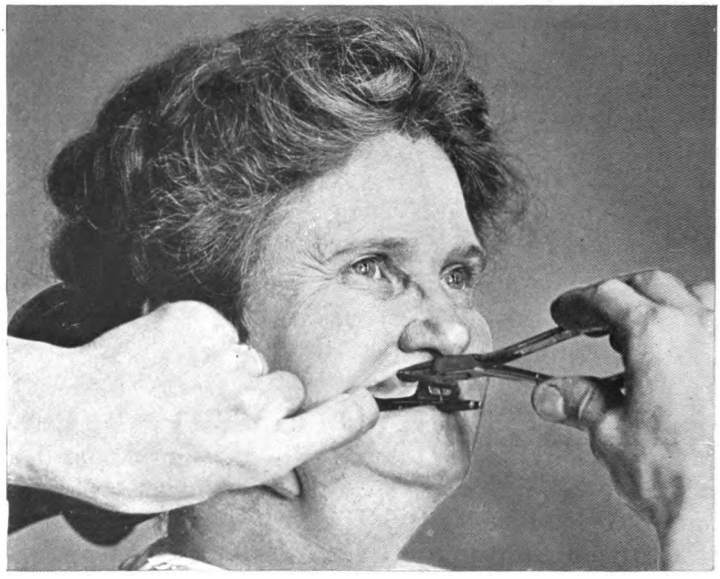

Fig. 126.

Locking the Bites.

Drop the pin of the Incisor Path Marker and cause the patient to close the jaw so that the point of the marker will be in the point of the incisor path tracing. Instruct the patient to hold the jaw firmly in this position. Grasp the handle of one bite lock tray with the pliers, as shown, apply soft compound to it. Carry it into the mouth so that the long diameter of the tray is parallel to the occlusal plane, and take an impression that includes the notches in the buccal surfaces of the bite rims. Take an impression of the other side in the same manner. When the bite lock impressions are chilled remove and place them in cold water until the impressions are poured and the casts ready for mounting on the articulator.

This method is equally applicable whether compound impressions and bite rims are used, or baseplate composition bases and wax bite rims.

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Determining the Depth of Relief.

The depth of relief of any individual mouth will depend upon the relation of the hard areas in the center of the mouth to the soft area of the ridges, on the form and extent of the bony areas in the center of the mouth, on the necessity of preventing interference with the circulation in the palatine vessels and on the history of previous dentures.

The depth of relief is estimated on the amount of settling anticipated in the plate. In Class I and Class II mouths, not of recent extraction, and with no history of rapid settling, only shallow relief sufficient to offset the warping in vulcanizing will be necessary. When the ridges exhibit much soft tissues, and the mouth is flat, only slight relief should be made. In recent extraction cases, much deeper relief must be made over the hard areas.

In cases where there is a marked bony prominence in the center of the mouth and where the tissues have been irritated by the pressure of previous plates, the relief must be uniform and deep over the hard area.

Any interference with the circulation in the palatine blood vessels will hasten the resorption of the ridge tissues and will cause loss of fit of the denture. It is probable that the loss of fit frequently seen in dentures constructed from tight fitting impressions is due to this cause. Freedom of circulation in the palatine blood vessels may be assured by scraping the impression at the location of the palatine foramina as described for Figure 126. If any bony prominences are located near the foramina, the relief should provide for them.

A depth of relief slightly in excess of immediate needs will do no harm.

If the relief is made in the impression as described on the following page it will result in a denture of uniform thickness over the palatal surface. Such dentures are less likely to split than those in which the relief is made on the cast after opening the flask.

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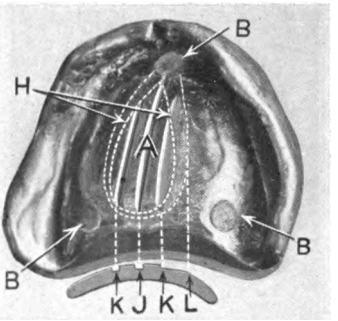

Fig. 127.

Relieving the Impression.

With a small Kingsley scraper, relieve an area about ¼ inch in diameter to a depth of about 1/16 inch over each of the three palatine foramina "B" "B" "B." Draw a median line "J" through the area "A" and lines parallel to it "K-K" on each side, about ⅛ inch apart until the whole area is lined. Scratch each line into the impression.

With a large hoe excavator channel the median line to the depth required for relief as far as the line "H." Diminish the depth outside the line "H" so that at the boundary of the area "A" the channel passes imperceptibly into the palatal surface of the impression. Channel the lines "K-K" not quite so deep as the median line. Channel successive lines to a shallower depth. Channeling establishes the depth of relief required in different parts of the area "A." Have the relieved area blend imperceptibly into the palatal surface of the impression.

With a scraper cut down the ridges of compound between the channels to the depth of the channels. Smooth the scraped area with sand paper and finish by rubbing with cotton slightly moistened with wood alcohol.

If cutting the relief has reduced the "suction," examine the impression at the posterior margin and the frenum notch and add black wax where bubbles are seen to escape when the impression is seated.

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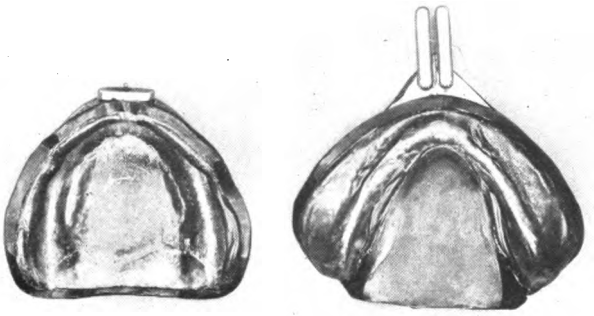

Fig. 128.

Preparing the Impressions for Making Casts, Part I.

Any fine grooves or imperfections in the ridge surfaces of the impressions may be filled by softening Trubyte carding wax between the fingers and working it into the depressions with a lukewarm wax spatula.

Fold a sheet of soft wax and with the doubled sheet form a floor to fill the tongue space of the lower impression by attaching it to the lingual side of the lingual flanges about 1/16 inch away from the rounded edge of the flange all around.

Fold a sheet of the same wax lengthwise and cut a strip ¼ inch wide, the long way. Attach one end of the strip to the wax floor at the lingual side of one heel. Bend it around the heel, around the buccal and lingual surface and around the other heel to the other side of the wax floor. With a hot spatula, attach it to the impression, keeping it 1/16 inch away from the rest of the flange and taking care not to soften or distort the flange.

Attach a ¼ inch strip around the upper impression in the same way, with the exception that across the posterior margin, the level of the wax should be 1/16 inch below the level of the palatal surface of the impression.

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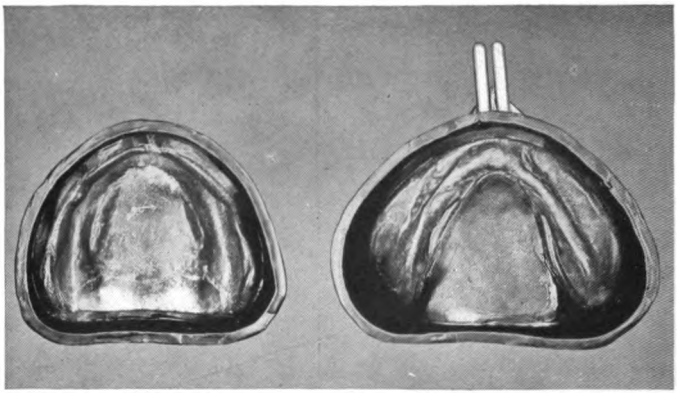

Fig. 129

Preparing the Impressions for Making Casts, Part II.

From a sheet of soft wax, folded lengthwise, cut a strip about one inch wide and bend around each model outside the narrow wax rim first placed. Attach this strip to the top of narrow wax rim with a hot spatula. When the strip has encircled the model, it will form a cup which will retain the cast material. The edge of this strip should extend far enough above the highest point of the impression, when in position for pouring, to insure a model at least 3/16 inch thick at its thinnest part. (A sheet of tin or lead may be substituted for this wax strip.)

When the casts are made they will be found very convenient for the shaping of baseplates and flasking and will permit accurate reproduction of the muscle trimmed margins in the dentures. Coat the impression and wax addition with thin Sandarac Varnish.

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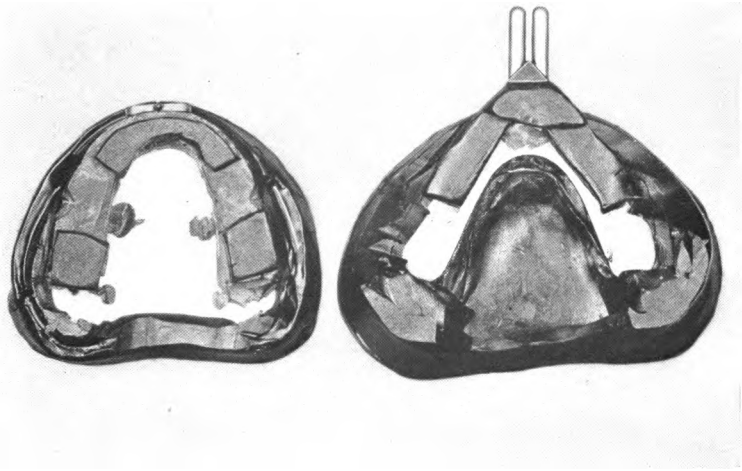

Fig. 130.

Protecting the Bite Rims and Records During Casting.

Small pieces of black carding wax are shown above attached to the occlusal surface of the upper bite rim and the occlusal surface of the Horseshoe Plate. This wax protects both rims and especially the incisor path record during the jarring of the cast material. Extend the pieces of wax along the Horseshoe Plate as far as the front of the incisor path record, without touching it. Lay the third piece of wax across the others above the record but not in contact with it. Do not place wax so that during manipulation or the removal of the wax this record will be destroyed.

Additional wax may be added to make the impressions set level.

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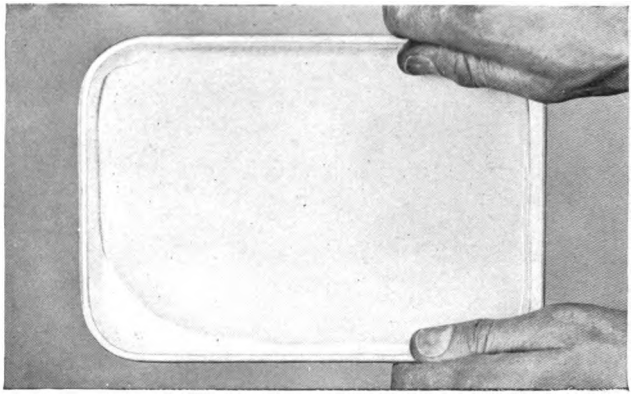

Fig. 131.

Mixing the Material for Casts.

Weinstein's Artificial Stone and Spence's Plaster are preferable to plaster of Paris for casts. The manufacturer's directions for the use of each are given on the packages. We employ the same technic to free both from objectionable bubbles. To avoid confusion only the technic for Spence's Plaster is given.

Take about 3½ parts of Spence's plaster to one of water, by bulk. Sift the plaster slowly into the water and spatulate thoroughly against the sides of the plaster-bowl for 5 minutes, using a bone paper cutter as a spatula. When mixing is finished the consistency is right if material dropped from the end of spatula will not flatten out.

Procure an enameled tray of fibre or paper maché, like that above shown, about 8 x 10 inches, and with shallow sides. Place in the tray about 3 ounces of the mixed Spence Plaster and jar the tray sharply against the top of the bench until bubbles cease to appear on the surface of the plaster. If bubbles come to the surface but do not break, break them by tapping with the finger.

With an ordinary flexible plaster spatula, raise some of the mixed plaster from the tray and place in the incisor depression of either impression.

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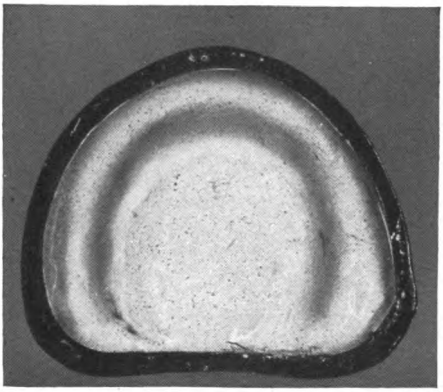

Fig. 132.

Making the Casts, Part I.

Hold the impression firmly in one hand and jar it sharply against the bottom of the other hand. Flow the first material placed, as far over the palatal surface as it will go, then add more on top of it and jar. Repeat until the entire surface of the impression is covered to a depth of about ⅛ inch. If the plaster tends to collect in the ridge depressions, work it to the other surface with the spatula and maintain an even thickness.

Add to the Spence Plaster in the bowl enough dry Spence Plaster to bring the mix just to that consistency which will show a clean fracture when broken between the fingers but is not crumbly. Mould this thickened mass into a roll about half an inch in diameter and pack into the ridge depressions by tapping with the fingers.

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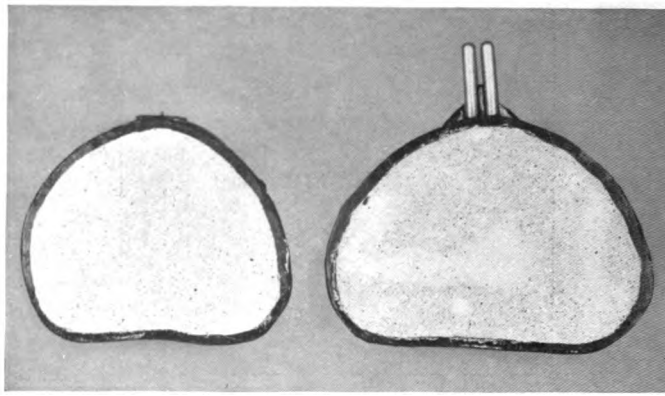

Fig. 133.

Making the Casts, Part II.

Continue to add the thickened material in the manner just described, tapping each portion to a union with that already in the impression, until the cup formed by the wax rim is level full, as shown above. In handling this material, it will be found that repeated tapping will cause it to spread better than it can be made to do by greater pressure applied once or twice.

The object of mixing this material to two consistencies is to eliminate bubbles and yet make a stronger cast than would be possible if the thin mixture were used throughout.

The supporting wax may be removed from Spence Plaster in about 2 hours and the impressions removed in about 4 hours. The wax may be removed from Weinstein's Stone models in about 6 hours and the impressions removed in 12 hours.

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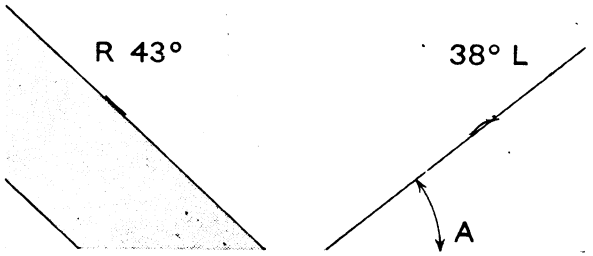

Fig. 134.

Reproducing the Descending Inclination of the Condyle Path, Part I.

If the Gysi Adaptable articulator is to be used, it should be adjusted to reproduce the descending and lateral inclinations of the condyle path, as recorded by the patient.

Lay the card with the record of the descending inclination of the condyle path on the bench and draw a line long enough to reach across both edges of the card, through the straight center portion of the record as shown under "L" above, disregarding any short curves at either end. The purpose of this line is to magnify the record. It is much easier to accurately measure the inclination of the long line than that of the shorter actual record. A transparent rule such as that beside the path under "R" above will be found advantageous for drawing this line.

Place the point of the aluminum Degree Plate which forms part of the articulator, at the end of the prolonged record where it crosses the lower edge of the card, and so that its zero side coincides with the lower margin of the card. Note where the line continued upward through the record, crosses the upper edge of the Degree Plate and record the number of degrees on the card above the record. The descending inclination of the right condyle path is here 43°; of the left path 38°.

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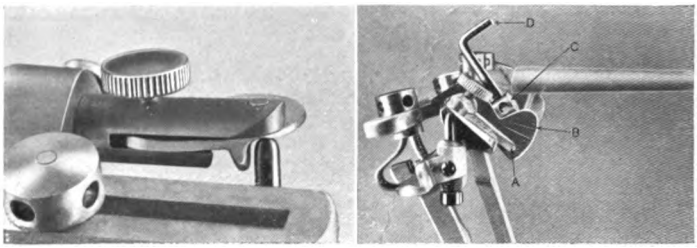

Fig. 135.

Reproducing the Descending Inclination of the Condyle Path, Part II.

The descending inclination of the right condyle path is to be reproduced by moving the pointer "A" on the right side of the articulator, on the vertical Degree Plate "B" until it registers the same number of degrees of downward inclination as the right path in Figure 133, 43°. The upper line on this Degree Plate registers 20°, the second line 30° and the third line 40°. To set a downward inclination of, say 25°, fix the pointer half way between the marks for 20° and 30°. For an inclination of 10° set the pointer as far above the 20° line as the 30° line is below it.

To move the pointer "A" loosen the setscrew "C" by means of the pin "D" which is attached to the straight Incisor Guide Pin. Place the pointer as desired and before tightening the setscrew, make sure that the vertical flange of the artificial fossa is in contact with the inner side of the condyle pin. This adjustment may be effected by placing a knife blade between the pointer "A" and the Degree Plate and forcing the pointer slightly outward.

Lock the setscrew, taking care not to strip the threads. Adjust the inclination on the left side in the same way.

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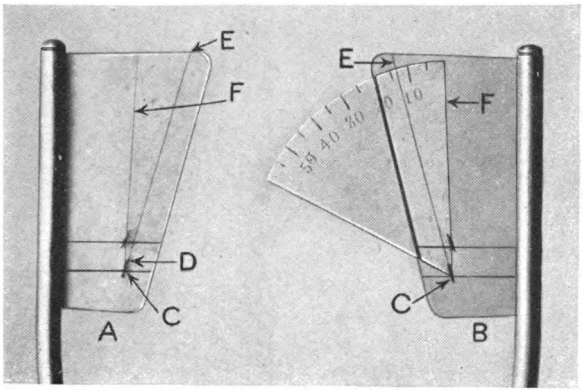

Fig. 136.

Reproducing the Lateral Inclination of the Condyle Path, Part I.

Lay the Condyle Path Register on a piece of white paper with the ground sides of the glasses upward. Place the edge of a transparent ruler along the record and starting at the point "C" in "A" where the record crosses the base line, draw a line which follows the general inclination of that section of the record between "C" and "D." Prolong the line to "E" at the edge of the glass.

Place a card so that its corner is at "C" and its lower margin coincides with the base line, and draw the line "F" perpendicular to the base line. Prepare the record of the other condyle in like manner.

Turn the Condyle Path Register so that the ground side of the glasses is downward as in "B." Place the Degree Plate which comes with the articulator so that its point is at "C" and its zero side coincides with the line "F." Read the number of degrees recorded by the line "C-E." Note the inclination in degrees on the card which records the downward inclination. Do the same with the record of the other condyle. The right lateral inclination is 13° for this case and the left is 5°.

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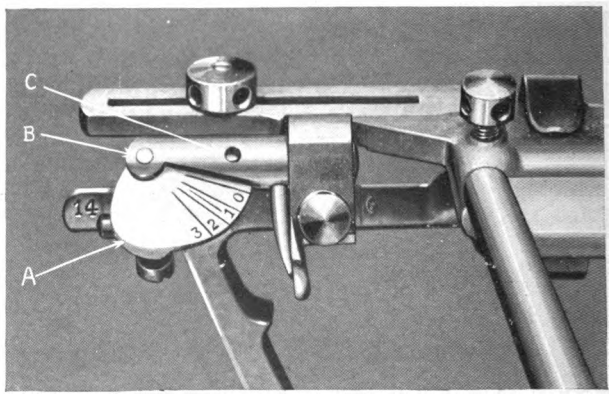

Fig. 137.

Reproducing the Lateral Inclination of the Condyle Path, Part II.

The lateral inclination of the condyle path is to be reproduced in the articulator by rotating the plate "A" which carries on its under side, the artificial glenoid fossa, about its pivot "B." The upper surface of the plate "A" is marked to show the lingual inclination of the vertical flange of the fossa on its other side.

The farthest backward of the lines is marked "0," and when this line is at the edge of the slot through which the plate works, the condyle cannot move laterally but must move straight forward. When the second line is at the edge of the slot, the fossa is inclined 10°. An inclination of 15° is shown by the short line half way between the 10° and 20° marks. The third long line shows an inclination of 20° and the fourth such line an inclination of 30°.

To rotate the plate "A," loosen the set screw which works in the hole "C" and which has here been removed to allow the plate and its markings to be better seen.

When the proper lateral inclination of the plate "A" is effected, tighten the setscrew. Adjust the plate on the other side of the articulator in the same way.

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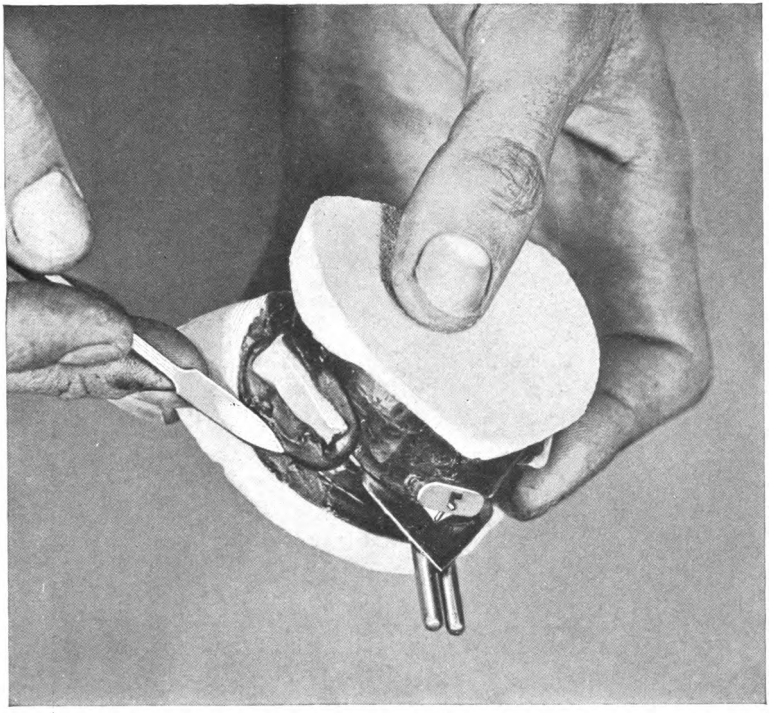

Fig. 138.

Locking the Bite Rims for Mounting.

As soon as the wax rims about the cast can be removed, thoroughly dry the Bite Locks. Remove all traces of wax from the occlusal and buccal surfaces of the bite rim. Place the upper and lower bite rims in contact and set the Bite Locks into the notches of which they took impressions. Drop the Incisor Path Marker and see that the point is in the point of the record. With a hot spatula seal the margins of the Bite Locks to the buccal surfaces of the bite rims. The impressions thus locked, are ready to be placed in the articulator.

Raise the pin of the Incisor Path Marker and lock it in this position.

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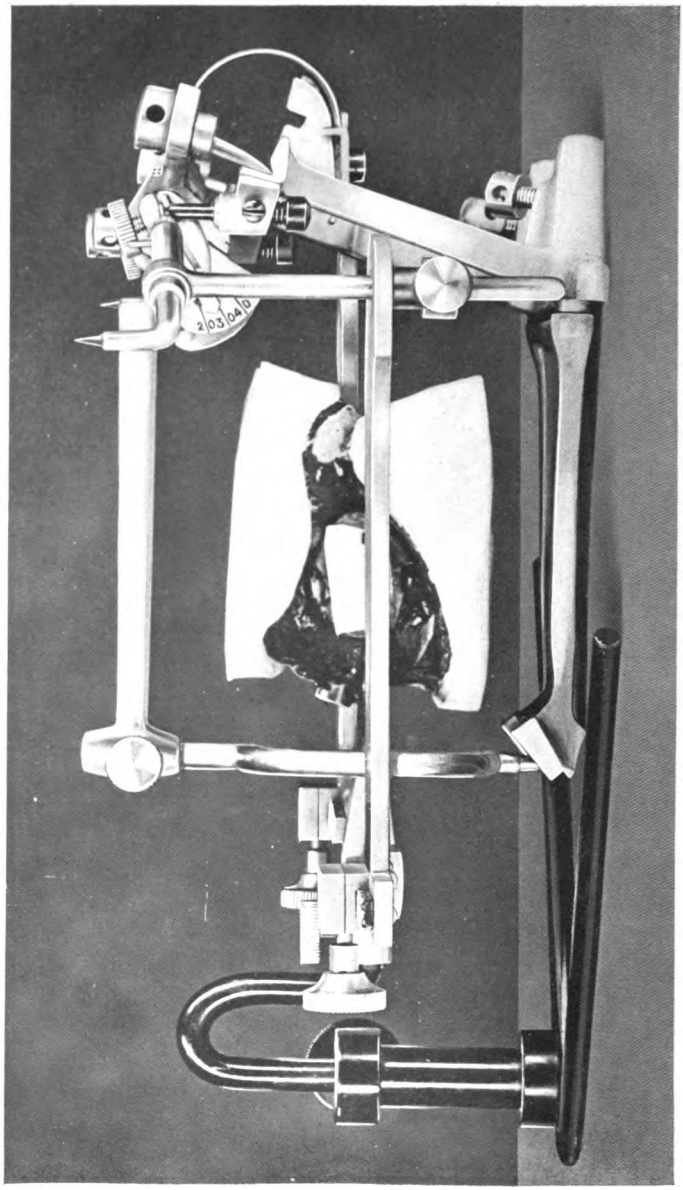

Fig. 139.

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Mounting Casts on the Adaptable Articulator.

Make sure that all the setscrews of the articulator are firmly set to prevent movement of the parts.

Substitute the Curved Incisor Guide Pin for the straight pin. The upper end of this pin should be flush with the sleeve which holds it. Place the Gooseneck in the black supporting frame and lock it by means of the setscrew. Insert the horizontal end of the Gooseneck into the hole in the forward end of the center block of the Condyle Path Register. Push the rods of the Horseshoe Plate, with bites and models attached, their full length into the back of the same block. Do not change the positions of the pencils.

Rotate the milled screws of the Condyle Path Register so as to bring the marks made in Figure 123 to the ends of the milled tracks.

Carefully introduce the articulating frame from the rear and move it until the curve of the Incisor Guide Pin partly encircles the front of the Horseshoe Plate and the ends of the horizontal pencils are directly opposite the tops of the condyle pins when viewed from front and top and equidistant from them.

If, when the wings of the Condyle Path Register are adjusted so that the marks made in Figure 123 are at the ends of the milled tracks, the distance between the points of the horizontal pencils is so great as to make difficult the adjustment of the pencils to the condyle pins in the manner described above, the wings of the Register may be moved in the following manner. When the points of the horizontal pencils are nearly equidistant from the condyle pins, measure the distance between the pencil and the condyle pin which appear to be closer together. Beginning at the black marks shown in Figure 123, lay off this distance on each wing of the Register, away from the median line, and make marks similar to those first made. Move both wings of the register until the marks just made are at the

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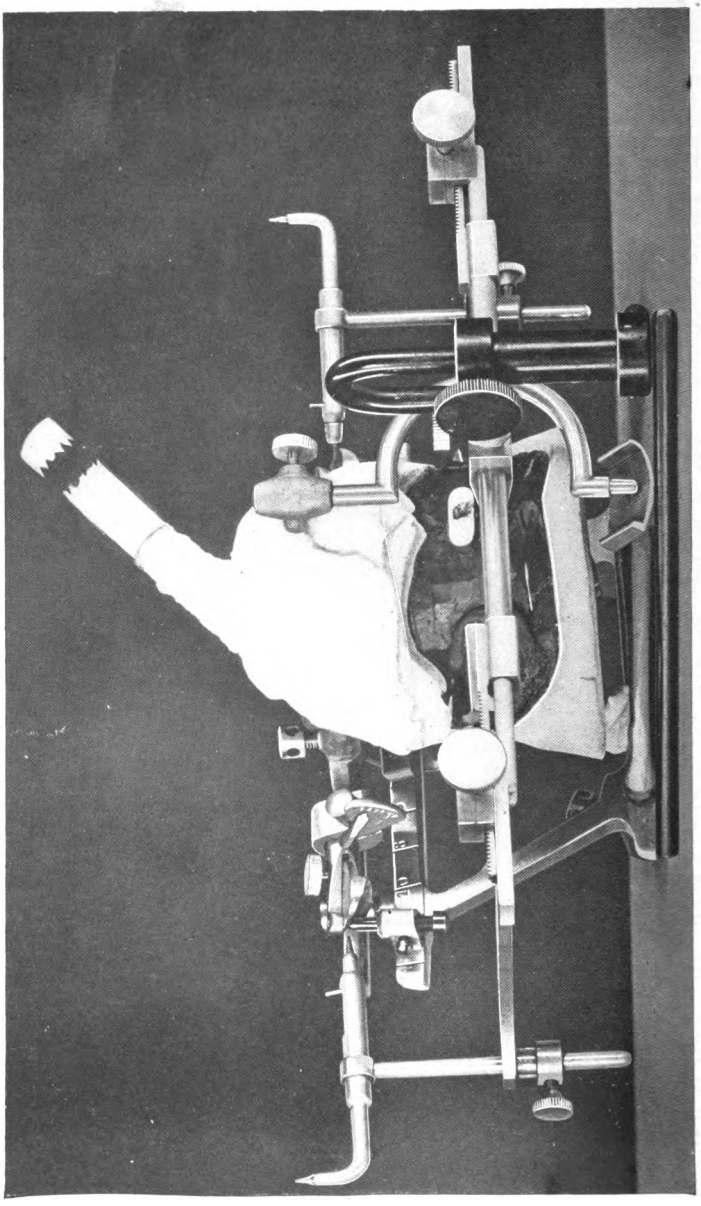

Fig. 140.

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ends of the milled tracks. This method insures moving each pencil an equal distance toward the median line. Bringing the pencil close to the condyle pins in this manner makes easy the establishment of correct relations.

Raise or lower the Gooseneck until the points of the pencils are on a level with the heads of the condyle pins.

Some patients present such long rami that it is impossible to bring the points of the horizontal pencils level with the heads of the condyle pins because the lower cast, even if very thin, strikes the lower bow of the articulator. In such cases adjust the Gooseneck until the lower cast just clears the lower bow. Move the Condyle Path Register until the pencils on the two sides are equal distances above the condyle pins when viewed from the front, and in the same relation to them as the normal case viewed from the side and from above.

The casts are now in position to be sealed to the articulator.

If the casts are made of Spence plaster, it will be unnecessary to score or wet them for the attachment of plaster of Paris. With Silex, paint an area about an inch in diameter in the center of the upper surface of the upper cast. This reduces the area of attachment of the plaster and makes it easier to free the cast for flasking.

Make a medium thick mix of plaster of Paris and flow over the upper bow and cast, so that it will be at least ¼ inch thick where it covers the bow.

When the plaster attaching the upper cast to the upper bow is hard, carefully remove the Condyle Path Register from the Horseshoe Plate. Invert the articulator as in Figure 141 and raise the lower bow out of contact with the Incisor Guide Pin. Paint an area an inch in diameter in the center of the cast with Silex and heap plaster, mixed medium thick, on the bottom of the lower cast.

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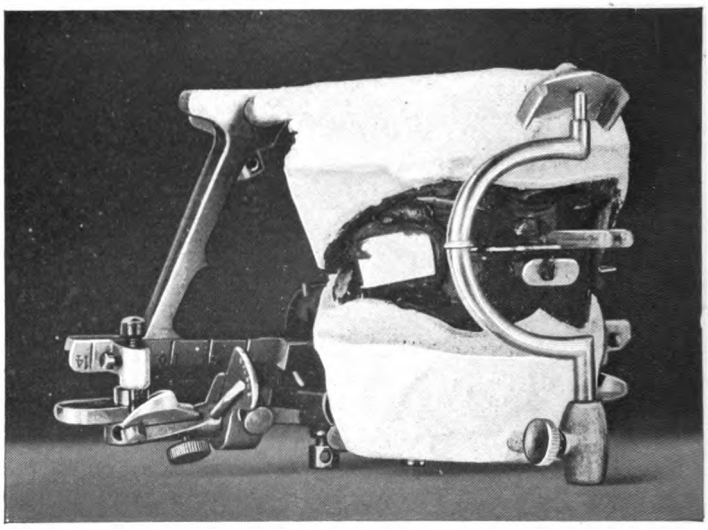

Fig. 141.

Mounting the Casts on the Adaptable Articulator—Continued.

Bring the lower bow downward into contact with the Incisor Guide Pin.

Make sure that the rotation pins are in contact with the vertical wall of the groove in which they work and that the condyles are in contact with the glenoid fossae. If the rotation points and condyle pins are not in the relation described, hold what is normally the upper part of the articulator, and pull downward and backward on what is normally the lower part, while the plaster is soft, until the pins are in the proper positions.

Form plaster over the lower bow so as to completely enclose it and attach it firmly to the cast. Press a sheet of glass upon the soft plaster until it touches the articulating frame in front and back, to form a flat surface on which the articulator may rest.

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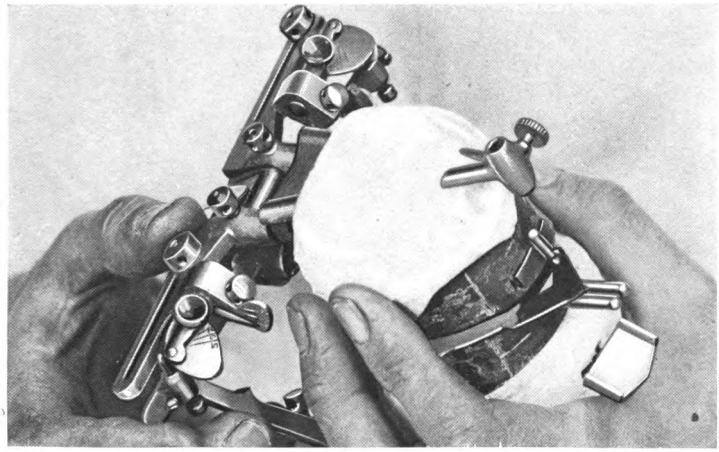

Fig. 142.

Locating the Rotation Points, Part I.

Remove the Bite Locks from both sides. Loosen the set-screw holding the rotation pin on the right side, and move the pin as far from the center as possible. Remove the Incisor Guide Pin. Hold the casts as shown and by straightening the fingers raise the upper bite rim slightly out of contact with the Horseshoe Plate. This prevents the Incisor Path Marker destroying the pattern on the Horseshoe Plate. Move the upper cast to the left until the point of the Incisor Path Marker is near the left and usually in front of the incisor path record. Make sure that the left condyle pin is in contact with its fossa.

By pressure outward on the lock nut, move the rotation pin away from the median line. Watch the point of the Incisor Path Marker, and when it is seen to enter the incisor path record, tighten the lock nut just enough to fix the rotation pin.

Bear in mind that the right rotation point governs the movement of the Incisor Path Marker on the left side of the median line and vice versa.

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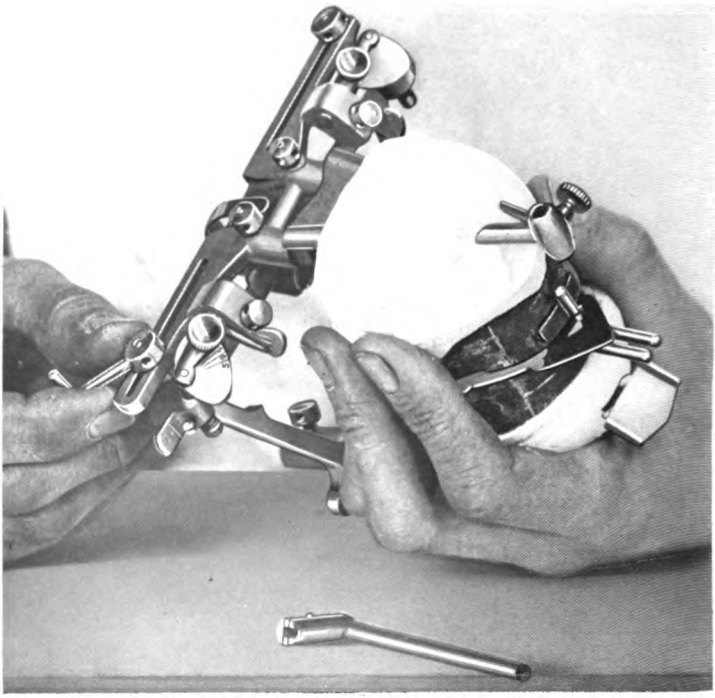

Fig. 143.

Locating the Rotation Points, Part II.

Allow the upper cast to move back toward the median line and note whether the point of the Incisor Path Marker follows the anterior margin of the incisor path record. If it does, tighten the lock nut just a little by means of the L shaped pin, but take care not to strip the threads.

If the point of the Marker travels in front of the margin of the record, move the rotation point away from the median line. If it diverges inward from the margin of the record, move the rotation point toward the median line.

Adjust the rotation point on the other side in the same manner.

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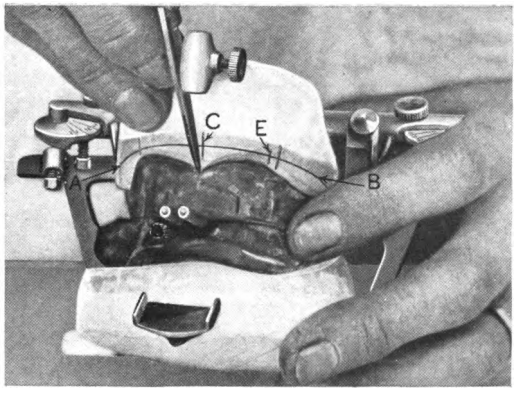

Fig. 144.

Marking Lines on the Upper Cast.

Remove the Incisor Path Marker. With a knife, prolong the median line and the cuspid location lines upward on the cast. With a pair of dividers, prick off points on the upper cast in a line parallel to the occlusal plane and make a permanent line, "A-B" through them. With the dividers space off the distance "C-E" on the line "C-B" equal to the distance from the point "C" to the plane of occlusion. If the plane of occlusion is lost during the arrangement of the teeth, it may be re-established parallel to the line "A-B" and as far below it as from "C" to "E." This line "A-B" is especially valuable while one is learning to arrange teeth but may not be so important when one is proficient. It was therefore omitted from the casts in the illustrations that follow.

Insert a knife under the Horseshoe Plate and pry it from the bite rim. Invert the articulator and hold the bite rims together. Place a knifeblade against the buccal surface of the lower at the right cuspid and inscribe the location of the anterior margin of the lower bite rim on the occlusal surface of the upper, from cuspid to cuspid. This will permit a correct re-formation of the lower bite rim.

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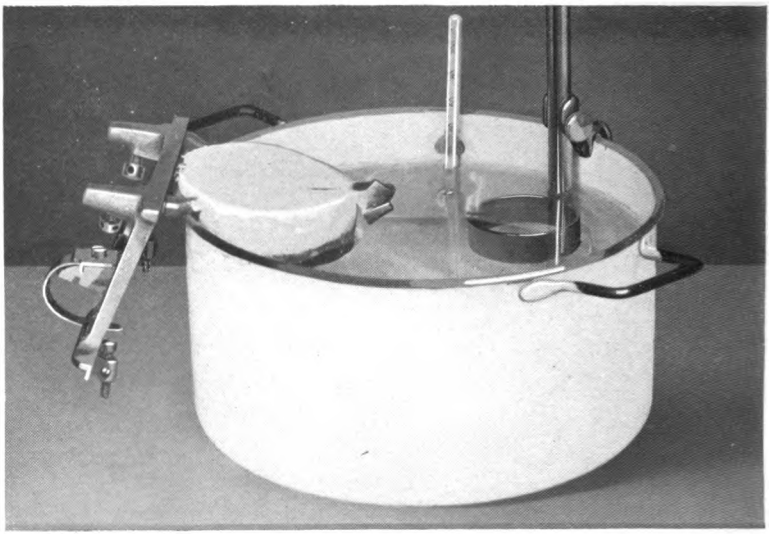

Fig. 145.

Removing the Lower Impression from the Cast.

Separate the lower section of the articulator from the upper by the method described in Fig. 156. Immerse the lower impression in water of 120° F. by suspending the lower part of the articulator over the edge of the hot water vessel in the manner shown, and adding water until it covers the compound but does not reach the plaster. When the compound is sufficiently soft, remove it from the impression. Do not remove the upper impression from the upper cast at this time.

Powdered soapstone or talcum rubbed on the impression surface of the cast will give it a fine finish and facilitate the adaptation of the baseplate.

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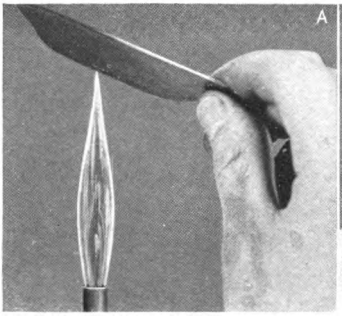

Fig. 146.

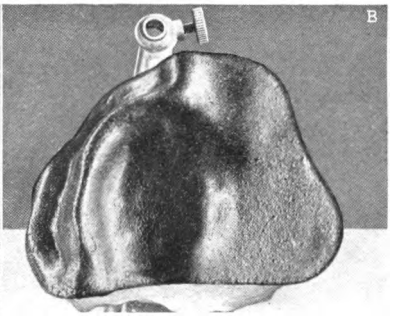

Fig. 147.

Adapting Baseplate.

The following technic is for adapting the upper baseplate. Adapt the lower in like manner.

Adjust the gas so that it produces a Bunsen flame 4 inches high. Hold a blank of Dentsply Baseplate Compound as shown and pass the outer 2/3 sideways in contact with the top of the flame, so that the blank crosses the flame in one second. Pass it 5 times in this way. If the blank be then held horizontally the heated portion should maintain its shape for about a second and then wilt. If the baseplate be held in the flame until it wilts, it will be overheated and will burn the fingers during adaptation.

Place the blank on the upper cast as shown in Figure 147 and adapt the palatal portion of the softened area closely to the cast by pressing for about half a second in one place, then raising the finger and moving it forward and repeating the pressure. The heat may be uncomfortable to the finger if the pressure is continuous. Continue the adaptation over the alveolar border and the buccal and labial surfaces.

When the adapted section is thoroughly chilled, use it as a handle while heating the other side which is then adapted. Any small portion of the flange not satisfactorily adapted may be separately heated and adapted.

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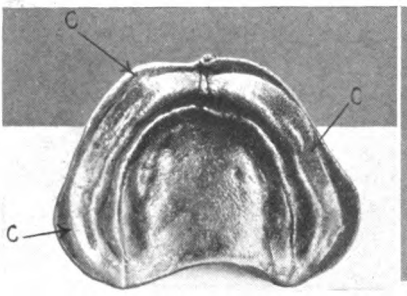

Fig. 148.

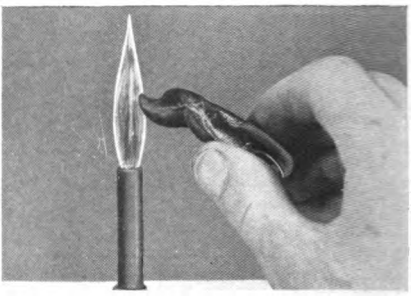

Fig. 149.

Adapting Baseplate—Continued.

Figure 148 shows a view of the palatal side of the partly adapted baseplate from the rear. Several creases are seen at the median line, in front, where the baseplate was folded when it was adapted to the labial surface. Turn the baseplate so that the left margin points directly downward and hold the folded portion against the side of the base of the flame for one second. Remove and wait two seconds to allow the heat to penetrate the material; then hold against the flame for a second. Repeat this form of heating until the surface of the baseplate in front of the ridge is very soft; then wait two or three seconds. Place the baseplate upon the cast and with intermittent finger pressure adapt the baseplate to the ridge so that the creases are eliminated as shown in the median line in Figure 150.

The line "C-C-C" marks the outer margin of the extension on the cast made by the narrow wax rim added in Figure 133. Trim away the surplus which extends outward from this line. It can be best trimmed by passing the surface once through the flame and cutting with shears.

Heat the baseplate, which rests on the extension of the cast material, by passing it once through the flame and folding the heated portion upon the buccal and labial surfaces by pressure as shown in Figure 150 and to the finished form shown on the right side of Figure 151. The

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Fig. 150.

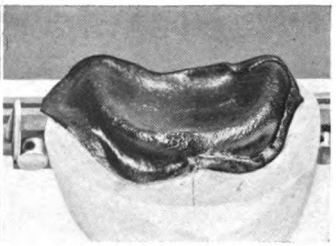

Fig. 151.

Adapting Baseplate—Continued.

folded portion is not heated enough to fuse with the baseplate against which it is folded. Fold the extension across the heel in the same manner. The margins thus shaped must conform to the muscle trimmed margins of the impression and constitute a valuable reinforcement of the baseplate.

When the cast presents an undercut which makes it difficult to withdraw the baseplate without marring the impression, adapt the baseplate only so far beyond the beginning of the undercut as will permit withdrawal without binding.

If the baseplate is broken during manipulation, place the broken pieces on the cast with the edges together. With a very hot spatula fuse the edges. Melt some of the surplus baseplate in the flame as sealing wax is melted and drop it on the break. Smooth the surface with the hot spatula.

In making partial dentures, especially lowers, any baseplate extending about the teeth should be reinforced by embedding hot wires in the baseplate, melting baseplate over the wires and smoothing the surface with a hot spatula.

The lower baseplate should be formed so that the lingual and bucco-labial margins are turned up in the manner described for the margins of the upper.

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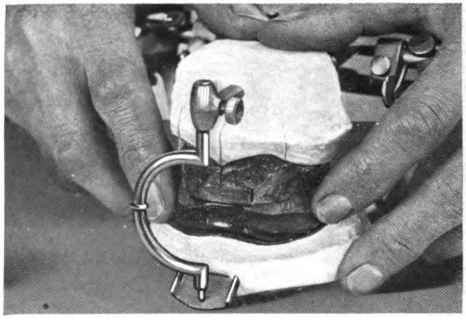

Flg. 152.

Re-forming the Lower Bite Rim.

The lower baseplate is in position on the lower cast. Soften the compound which formed the lower impression and bite rim in hot water and mould it into a roll half an inch in diameter and about as long as the bite rim. Place this on the lower baseplate so that the center of the mass is approximately over the center of the lower ridge. With the incisor guide pin in place, close the upper bite rim upon the roll.

When the roll is cool, trim the excess fullness from the labial surface until the line scratched upon the occlusal surface of the upper bite rim in Figure 152 shows when the upper and lower are in contact. Trim the buccal surfaces from the cuspids to the heel flush with the buccal surfaces of the upper rim.

With a flame from the mouth blow pipe and the alcohol lamp, heat the occlusal surface of the lower bite rim to a very shallow depth and press it upon a moist glass to smooth the surface, but do not change the height of the plane of occlusion. Attach the bite rim to the lower baseplate as follows. With a very hot flame from the mouth blow pipe and an alcohol lamp, heat the compound in the deepest part of the impression made by the ridge of baseplate, until it sputters, but do not heat the sides or margin of this depression. Place the bite rim upon the lower baseplate and close the upper upon it.

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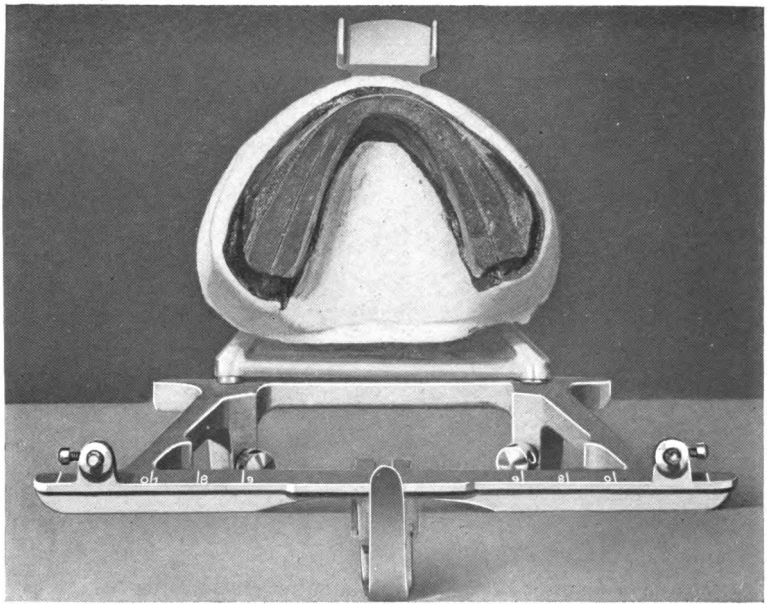

Fig. 153.

Trimming and Marking the Lower Bite Rim.

With a sharp knife trim the lingual surface of the lower bite rim to the form shown here. This surface slopes from the lingual margin of the baseplate upward and a little outward. This places the compound in the relation to the ridge which it is desired that the finished denture shall occupy. This form of lingual surface must sometimes be modified in the region of the lower second molars, but when it can be effected it allows free action of the tongue without danger of displacing the lower denture.

Trim the buccal surface so that the width of the occlusal surface of the rim in the bicuspid region is about equal to the bucco-lingual diameter of the bicuspids and the width of the surface in the molar region is about equal to the bucco-lingual diameter of the molars. Locate the center of the occlusal surface at the cuspids and at the heels. Connect the two points with lines having a slight outward curvature similar to that of the rim, as shown above.

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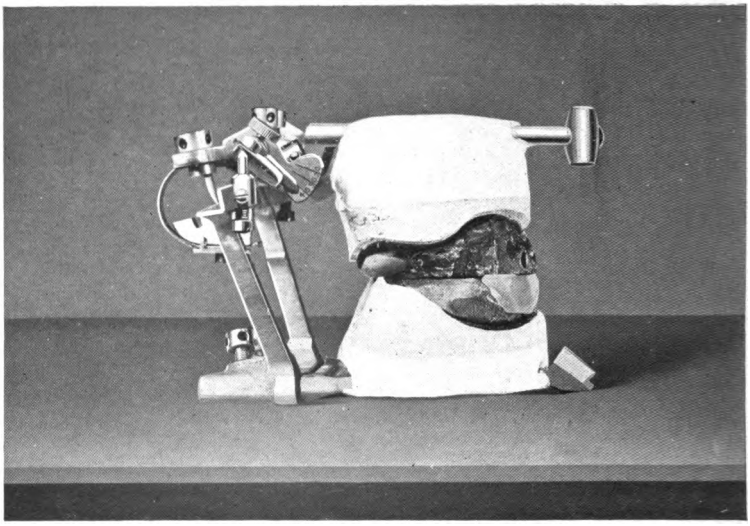

Fig. 154.

Building the Lower Bite Rim Forward.

Soften a small quantity of Dentsply Baseplate Wax over the flame and with it build the labial surface of the lower bite rim forward to be flush with the labial surface of the upper bite rim. The upper bite rim is to be rebuilt in wax, and this method of adding to the lower affords a guide to assist in establishing proper fullness in the upper bite rim.

Remove the upper impression from the cast, using the same technic as was described for the lower in Figure 150.

Make the upper base plate, using the technic described for Figures 146 to 151 inclusive.

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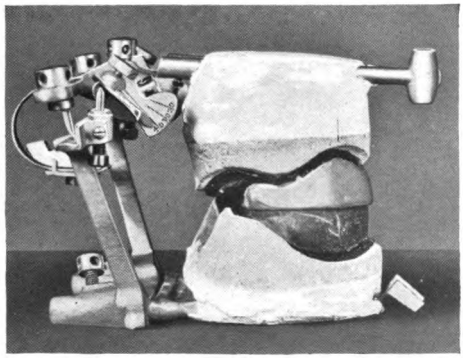

Fig. 155.

Re-forming the Upper Bite Rim.

This bite rim is to be re-formed in wax. Pass the long diameter of a sheet of Dentsply base plate wax above a bunsen flame until one side of it is fluid. Hold it with the fluid side upward. Double the melted side upon itself. Beginning at one end of the fold, pinch the softened surfaces together, gradually working toward the other end. Repeat this heating, folding and pinching process three times in all. Now heat the strip and double it lengthways upon itself. When the folding is complete, grasp two surfaces of the strip so formed between the thumb and index finger of one hand, and the two remaining surfaces between the thumb and index finger of the other hand and gradually work the roll between the fingers, pinching it into the form of a square bar.

Place the incisor guide pin in position. Lay this square bar of wax on the occlusal surface of the lower bite rim and close the upper upon it. Trim the buccal margins flush with the buccal margins of the lower bite rim, trim the labial margin flush with the labial margin of the wax addition to the lower. Shape the upper part of the labial surface to about the fullness and the form of the compound bite rim which was removed. The illustration above shows the completed upper wax with the wax addition to the front of the lower bite rim removed.

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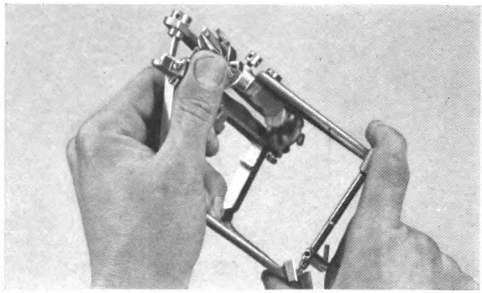

Fig. 156.

Removing and Replacing the Upper Part of the Adaptable and Simplex Articulators.

Grasp the front portion of the articulator between the thumb and first finger of the right hand as shown. Grasp the rear vertical portion of the articulating frame with the first three fingers of the left hand and place the end of the left thumb under the front end of the vertical flange of the fossa. Push directly upward on this flange until the rotation pin rises above the level of the front wall of the groove in which it works. Carry the end of the left thumb forward and the upper part of the frame with it until that part of the articulator—in contact with the spring—slides out from under the spring and the upper section of the articulator is separated from the lower.

To assemble the articulator reverse the procedure described above. Locate the left condyle and the left rotation pin correctly and engage the web of the articulator under the spring, place the left thumb under the forward end of the right fossa. Now grasp the front part of the articulator as illustrated so that the Guide Pin is in contact with the Incisor Guide Incline, then press upward and backward with the thumb until the rotation pin clears the anterior wall of its groove. Release the upward pressure, when the rotation pin and the condyle will settle into their proper locations.

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Part IV

Arranging The Teeth

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Arranging the Teeth.

The upper bite rim was formed to give a desired expression to the upper lip and in arranging teeth it is essential that they maintain the fullness and curvature established by this rim. Begin at the central on each side and work backward to the cuspid. Detailed instructions for setting these teeth will be given.

The upper bicuspids and molars are to be so placed that the center of their longitudinal grooves will be as nearly over the lines traced on the occlusal surface of the lower bite rim in Figure 149 as the curvature of the upper bite rim and esthetics will permit.

It is usually better to allow the upper teeth to set outside of the upper ridge a little rather than move the lower teeth into the tongue space.

When the upper teeth are all in position, the lower teeth on each side will be set in the following order, first molar, second bicuspid, first bicuspid, cuspid, incisors, and second molars.

In setting the teeth use only enough wax about each tooth to attach it to the baseplate, leaving the addition of wax for the restoring of expression until the teeth have been tried in the mouth and satisfactorily adjusted. It is advantageous to use as little wax as possible in placing the teeth because the shrinkage of a large quantity of fluid wax may distort the baseplate and pull the teeth out of the desired position.

To begin setting the teeth, cut a place clear through the upper bite rim, on one side of the median line, as shown, large enough to receive the upper central incisor.

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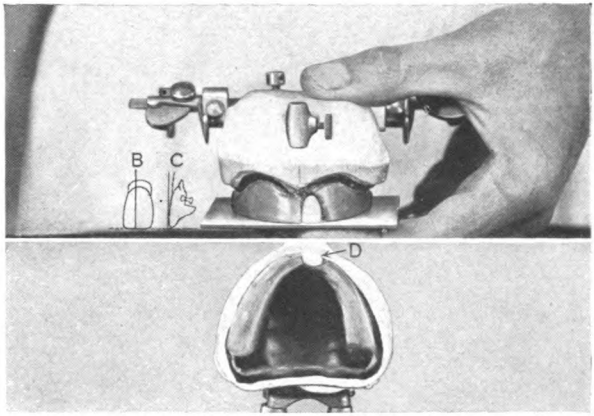

Fig. 157.

Arranging The Upper Anteriors.

Remove the upper bow from the articulator. Procure a Trubyte Occlusal Plane or a flat piece of wood or aluminum 2½ inches square, and use it as shown in the following illustrations to take the place of the occlusal surface of the lower bite rim.

Before waxing the upper central in place, try for mechanical suitability. If necessary carve away the baseplate under the tooth or grind the ridgelap, or do both so that the tooth will not rest directly against the cast. The long axis of the upper central should be vertical when seen from the front and inclined downward and forward when seen from the side as shown in "B" and "C". The incisal edge is in contact with the occlusal plane. The upper centrals are not set at right angles to the median line, but the distal angles are inclined slightly backward and begin the curvature of the tooth row to follow the contour of the bite rim.

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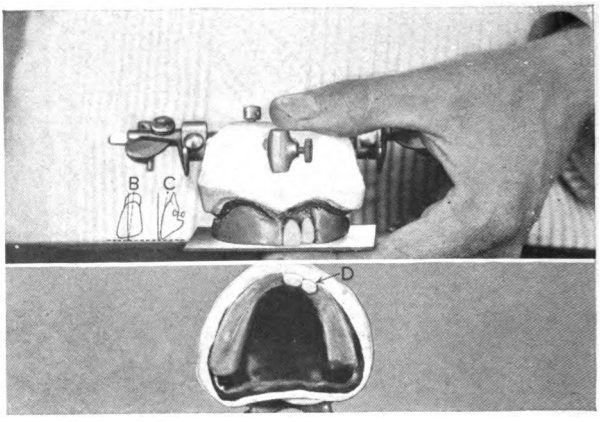

Fig. 158.

Arranging the Upper Anteriors—Continued

Cut a space through the upper bite rim for the upper lateral and try it in place as the central was tried. Set it so that the incisal edge is about ¾ of a millimeter above the level of the occlusal plane and so that the long axis is inclined as shown in "B" and "C." This downward and forward inclination of the vertical axis of the upper laterals results in making the neck of this tooth less prominent than that of the upper central. This depression will be found very valuable when giving expression to the teeth.

The incisal edges of the laterals are set to maintain the curvature established by the incisal edge of the upper bite rim, as shown at "B."

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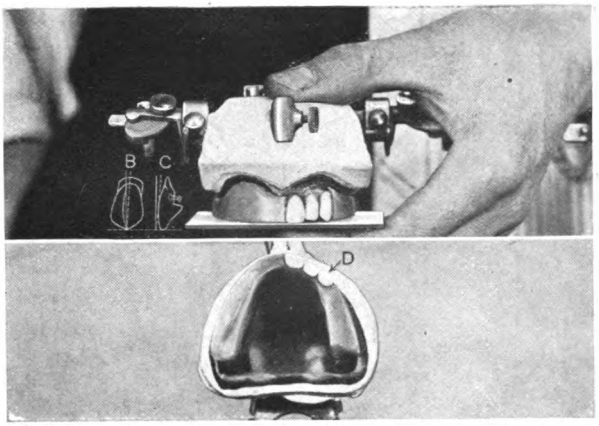

Fig. 159.

Arranging the Upper Anteriors—Continued

Cut a space clear through the upper bite rim to receive the upper cuspid. Try the tooth for length as the central and lateral were tried. Set the tooth so that its tip just touches the occlusal plane and its long axis is inclined as shown in "B" "C" and at the edge of the tooth continue the curve of the bite rim as shown at "B".

The labial ridge of the cuspid is properly the dividing line between the labial and buccal sections of the ridge. The labial surface mesial to the ridge faces the lip and maintains the general curvature established by the central and lateral. The surface distal to this ridge faces the cheek and begins the curvature characteristic of the bicuspids and molars. The effect of setting Trubyte cuspids in this position is to carry the distal angles farther

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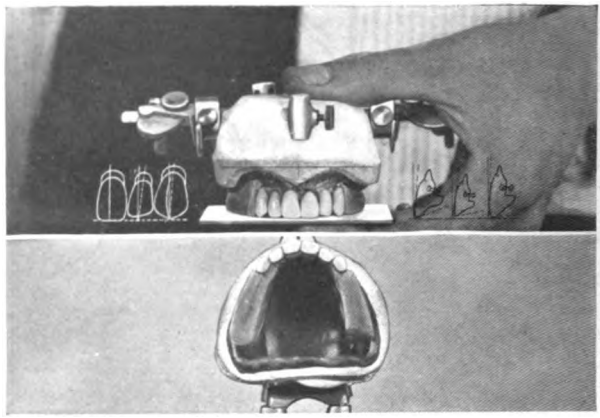

Fig. 160.

Arranging the Upper Anteriors—Continued.

inward toward the median line than has been possible with the conventional forms of cuspids. When Trubyte cuspids are set in this way, only the mesial aspect can be seen from the front. This permits the use of teeth large enough for the mouth, without their appearing too large. The esthetic effect of this arrangement is greatly enhanced by the natural shading of the teeth in the set.

When the central, lateral and cuspid of one side have been set, set the central, lateral and cuspid on the other side in the same manner.

Replace the upper part of the articulator in the manner described for Figure 156 and use the occlusal surface of the lower bite rim as the occlusal plane while setting the upper bicuspids and molars.

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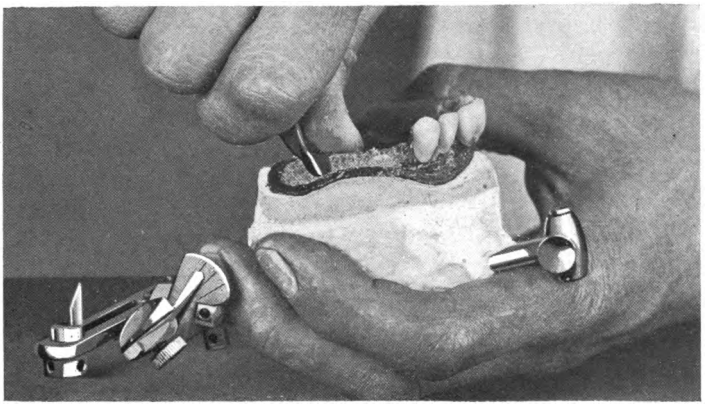

Fig. 161.

Arranging the Upper Posteriors.

When the bite is so close as to make it impossible to use the length of bicuspids and molars desired without destructive grinding, the base plate against which the teeth are to rest should be scraped as thin as possible without perforating it. Trubyte bicuspids and molars are made in four mesio-distal widths 28, 30, 32, and 34 millimeters. Each width is made in three vertical lengths known as short, medium and long, distinguished by the letters "S," "M," "L" on the neck end. The manufacturer's card with the anteriors, the bicuspids and molars of the mesio-distal width and vertical length most suitable for the average case. The range of length makes it possible for the dentist to select shorter or longer teeth to accompany any given anteriors, if his judgment so indicates. He may also select wider or narrower bicuspids and molars than those regularly carded, but when bicuspids and molars wider than those regularly carded are selected to go with any given anteriors, the mesial sides of the lower first bicuspids and perhaps the distal sides of the lower cuspid will require some grinding, to provide room for the placing of the lower anterior.

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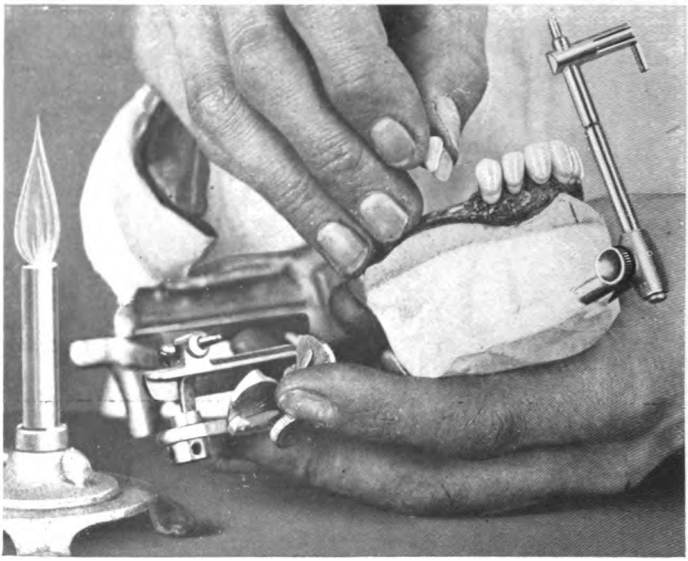

Fig. 162

Arranging the Upper Posteriors, Continued.

Fit each posterior tooth to its position before waxing it in place, as the anteriors were fitted. Make sure that each tooth is short enough so that there is a free space of at least a millimeter between it and the baseplate. Cut a strip one-half inch wide along the side of a sheet of Dentsply Baseplate Wax and soften one end of it in the flame. Detach a small portion and form it into a cone. Soften the end of the cone in the flame and force it about the pins or into the recess in the diatoric tooth. Using the tooth as a handle, soften the other end of the cone and press it upon the ridge with the tooth in approximately the correct position. Close the articulator so that the incisor guide pin comes into contact with the incisor guide incline. Adjust the teeth so that the center of the longitudinal groove is over the front-to-back line on the occlusal surface of the lower bite rim. The buccal cusp of the

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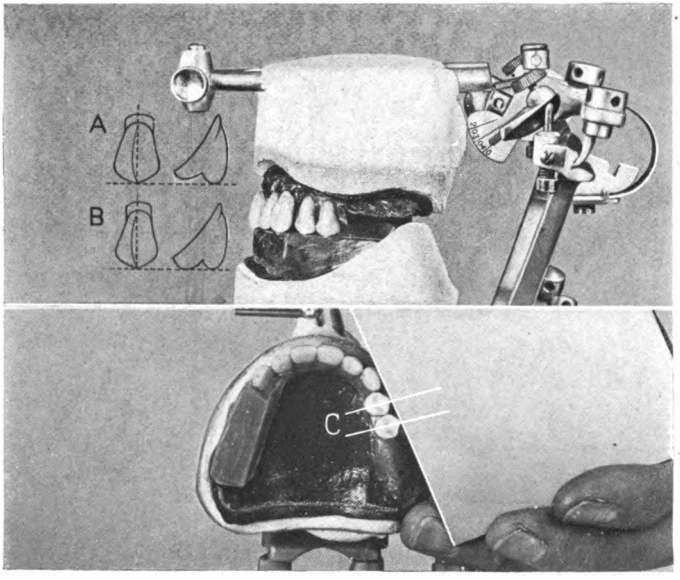

Fig. 163

Arranging the Upper Posteriors, Continued.

upper first bicuspid should touch the occlusal surface of the lower bite; the lingual cusp should be raised about one-half millimeter above that rim. When the tooth is first placed, the long axis of the tooth, as seen from the buccal, should be vertical, as shown at "A" in Figure 163. This may be slightly modified in establishing articulation.

The second bicuspid should be set like the first except that both cusps touch the opposing bite rim, as shown at "B" in Figure 163. Rotate both bicuspids upon their long axes so that the occlusal surfaces are inclined as shown by the lines in "C," Figure 163.

With the straight edge of the Trubyte Occlusal Plane test the position of the buccal surface of the bicuspids in relation to the cuspids. When these teeth are in proper relation for the average case, the straight edge should touch the buccal surfaces of all three teeth.

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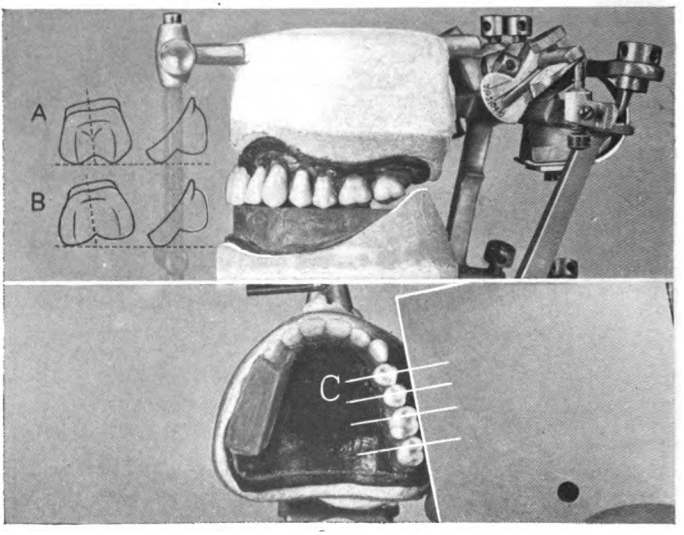

Fig. 164

Arranging the Upper Posteriors, Continued.

Attach the upper first molar to the ridge as the bicuspids were attached. The long axis of this tooth, when seen from the buccal is inclined downward and backward as shown at "A," Figure 164. Only the mesio-buccal cusp of this tooth should touch the occlusal surface of the opposing bite, the disto-lingual cusp being slightly raised and the buccal cusp being raised about three-quarters of a millimeter out of contact, as shown in "B," Figure 164. This arrangement produces the average compensating curve. When a greater curvature is required, the distal cusps should be elevated more. The tooth should be rotated upon its long axis as shown at "C" in Figure 164.

The upper second molar is now placed in position, with its lingual cusp lightly touching the occlusal plane and the buccal cusp raised about one and one-half millimeters out of contact. If a greater curvature is desired, the lingual cusp should be elevated out of contact and the buccal cusp elevated in a corresponding degree. The long axis seen from the buccal, is inclined downward and backward more than was the first molar.

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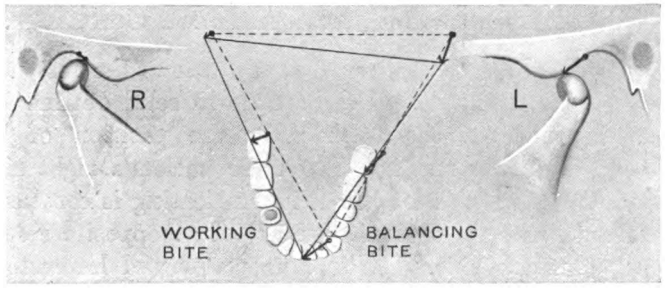
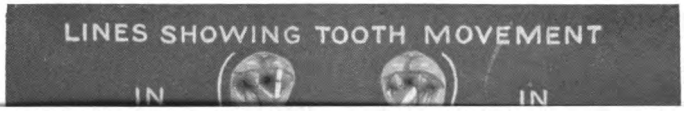


Fig. 165



ERRATUM

Page 192, line 4. The sentence beginning "Only the mesio-buccal cusp" etc., should read: "Only the mesio-lingual cusp of this tooth should touch the occlusal surface of the opposing bite, the disto-lingual cusp being slightly raised and the buccal cusps being raised about three-quarters of a millimeter out of contact, as shown in the second diagram of "A", Figure 164".

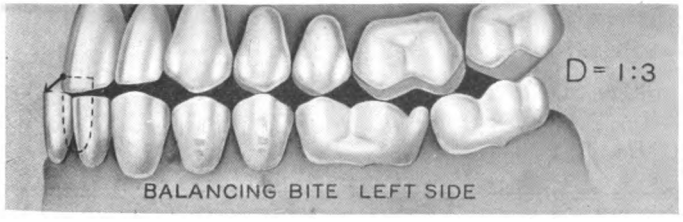


Fig. 168

Description on page following.

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Working and Balancing Molar Contacts.

The dotted triangle in Figure 165 shows the rest position of the mandible. The triangle in solid outline and the diagrams of the teeth show the position of the mandible during mastication on the patient's right side. The side on which the patient is masticating is commonly referred to as the "working side." The opposite side is the "balancing side." When the upper and lower teeth come into working contact, the upper and lower buccal margins are interdigitated. The movement of the teeth on the working back to a position of rest is nearly at right angles to the median line. The movement of the teeth on the balancing side is much more nearly parallel to the median line. The arrows on this diagram are those of the movement of the teeth on the articulator.

The white lines on the occlusal surface of the molars "In Working Contact," in Figure 166, show the line of movement of the lower teeth across the uppers during mastication. The white lines across the occlusal surfaces of the molars bracketted in Figure 166 with the title "In Balancing Contact" show the line of movement of the lower molars across the uppers on the balancing side. The arrangement of teeth to harmonize with these lines of movement will be easy if they were carved with these movements in view; otherwise it will be difficult. Trubyte teeth were carved to produce these movements in the average case, and when used on the Simplex articulator require practically no grinding. When the Adaptable is used the teeth will require grinding in proportion as the adjustments vary from the average.

Relations of the upper and lower teeth on the left side in working contact, are shown in Figure 167. The relations of the teeth on the same side, in balancing contact, are shown in Figure 168.

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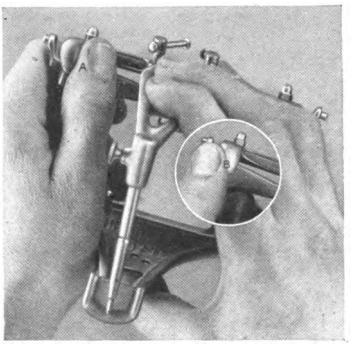

Fig. 170

How to Move the Articulator Properly.

There are correct and incorrect ways of moving the bows of the Adaptable and Simplex articulators from side to side, in arranging teeth. If the incorrect way is followed, the articulator will be of little use.

Hold the articulator above and below, as it is here shown in the right hand. This holds the Incisor Guide Pin in contact with the Incisor Guide Incline and any opposing teeth lightly in contact. Place the fore part of the ball of the thumb of the other hand on the inner side of the artificial fossa as shown at "A" (not against the front as shown at "B"), and make pressure outward, downward and backward. This forces the vertical flange of the fossa against the condyle pin and compels the condyles to follow the correct downward and lateral inclinations. The arrangement of the teeth will be greatly facilitated if the condyle is compelled to follow the correct path every time the articulator is moved.

Do not place the thumbs against the front of the two fossae at one time to make side to side movements, lest one side be pivoted against a thumb instead of following its proper path. Use both thumbs at once only to throw the teeth into incising relation.

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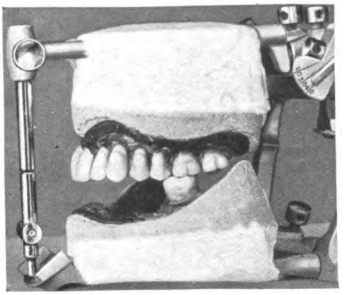

Fig. 171

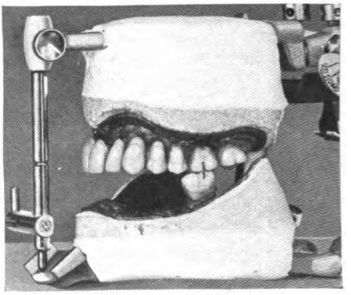

Fig. 173

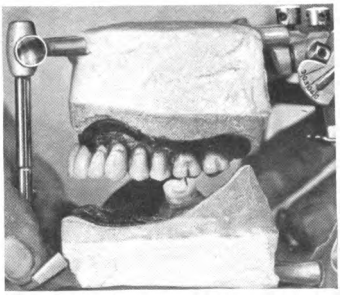

Fig. 172

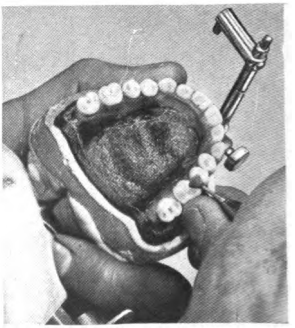

Fig. 174

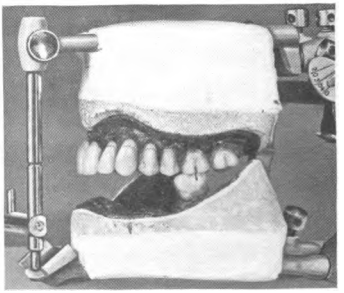

Fig. 175

For description see the page following.

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Arranging the Teeth.—The Lower First Molar.

Apply a cone of wax to a lower first molar. Open the articulator and attach the molar to the ridge in approximately the correct position, but too high. Close the articulator, forcing the molar toward the ridge. Guide it to correct occlusal relations with the uppers as in Figure 171. Wax the molar firmly in position. Make pressure on the right fossa of the articulator as described for Figure 170 and throw this molar into working bite with the uppers, as in Figure 172.

A black line has been drawn along the buccal ridge of the middle cusp of the lower molar. It should be continuous with the black line in the buccal groove of the upper molar. The break in the line in Figure 172 shows that the lower molar is too far forward for articulation. Figures 171 and 172 show that teeth may be in good position for occlusion without being in position to articulate.

In Figure 173 the lower molar has been moved backward so that the black line is continuous with the line on the upper, in working bite, but the buccal cusps do not interdigitate with the upper cusps. Errors of this kind can usually be corrected by depressing the buccal cusps of the upper molar, but in this case the steep descending inclination of the condyle path, with the slight lateral inclination, necessitated grinding the teeth to a deeper bite.

With a fine grit inverted cone stone the mesial marginal ridge of the upper molar and the distal marginal ridge of the lower molar were ground until they could be properly interdigitated. This grinding is shown in Figure 174.

In Figure 175 the molars are shown in working bite after deepening of the sulci by grinding has been completed and the lower molar reset to proper contact with the upper. The space between the upper second bicuspid and the lower molar in Figure 173 has been decreased by deepening the bite of the molars and raising the lower molar.

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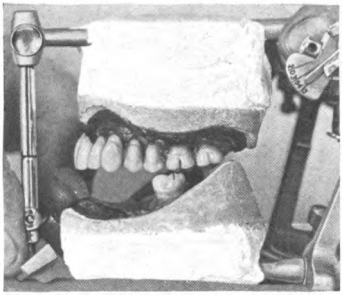

Fig. 176

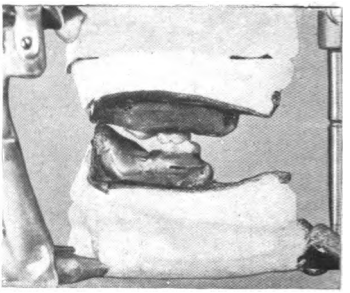

Fig. 178

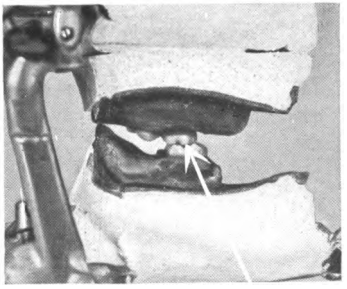

Fig. 177

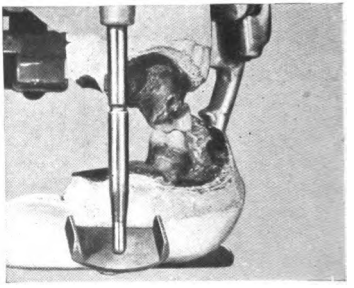

Fig. 179

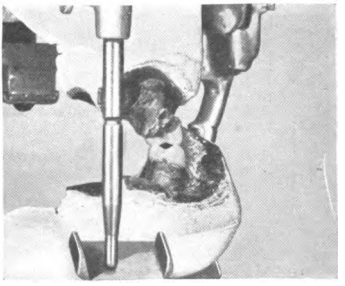

Fig. 180

For description see page following.

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Arranging the Teeth.—The Lower First Molar. Continued.

The lower first molar in Figure 176 is in the same position on the ridge that it occupied in Figure 175, but the articulator has been moved so as to throw this side into balancing relation. The triangular ridge of the mesio-lingual cusp of the upper molar should slide in the disto-buccal groove of the lower molar, along the white lines of contact "In Balancing Bite" in Figure 166, but cusp and groove are separated by a slight space. A defect of this kind can usually be corrected by depressing the lingual cusp of the upper molar until contact is established and waxing the upper firmly in that position. It may be necessary to rotate either the upper or the lower on its vertical axis until the cusp works smoothly in the groove.

Examine the working bite articulation from the lingual, as shown in Figure 177. The slight prominence of the mesio-lingual cusp of the lower molar, indicated by the arrow, prevents correct relations in the working bite. Grind this away with the inverted cone stone, being careful to maintain the original inclination of the cusp planes. Do not grind a flat surface on the tip of the cusp. After grinding, raise the lingual cusp of the lower molar until it takes the relation of the upper shown in Figure 178, when in working bite.

The upper and lower molars, in occlusion, should mesh as in Figure 179. The buccal cusp of the lower should fill the V-shaped longitudinal groove between the lingual and buccal cusps of the upper. The lingually inclined plane on the lower buccal cusp should be in contact with the buccally inclined plane of the lingual cusp.

Figure 180 shows the relation of the upper and lower molars in working bite.

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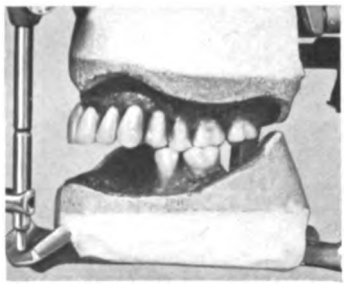

Fig. 181

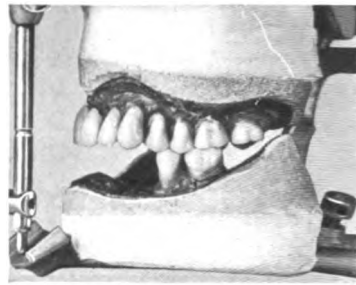

Fig. 182

Arranging the Teeth.—The Bicuspids.

After completing the articulation of the upper and lower molars for the case here illustrated, the distal marginal ridge of the upper second bicuspid was ground in the manner described for the first molars until the buccal cusp of the bicuspid could be brought down in contact with the buccal cusp of the lower molar when in working bite relation. The tooth was then examined from the lingual and adjusted to mesh properly with the lower molar in working bite.

Attach a cone of wax to the neck of the lower second bicuspid and place it on the ridge in the manner described for the molar and with a spatula press it into approximate occlusion with the upper second bicuspid. Move the articulator so as to test the articulation in working bite, which is shown in Figure 182, and in balancing bite. When the lower second bicuspid has been properly articulated with the upper second bicuspid, move the upper first bicuspid into proper articulating relations with the lower, as shown in Figure 182.

The space between the lower second bicuspid and the molar in Figure 182 will exist whenever the conditions of the case necessitate a compensating curve of more than

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average steepness. The existence of such spaces compensates, in part, for the shrinkage of rubber in vulcanizing and reduces the liability of error from the teeth being forced into improper contact through that shrinkage.

Set the lower first bicuspid for occlusion and then for articulation by the methods described. Arrange the lower first molar and the bicuspids of the opposite side, using the same technic. Do not set the lower second molars until the arrangement of the teeth has been tested in the mouth and proven satisfactory.

Set the lower six anteriors to approximate positions to determine whether they meet the requirements of the case as to width and length. If insufficient space exists between the lower bicuspids to permit setting the lower anteriors because of irregularities in the alignment of the upper anteriors, additional space may be made by grinding the distal sides of the lower cuspids or the mesial sides of the lower first bicuspids. If sufficient space cannot be provided by such grinding, or if, because of the necessity of setting the lower incisors directly above the lower ridge, anteriors considerably narrower than those regularly carded with the uppers are required, select anteriors of the next smallest size in the same form, using the Mould Guide illustrated on page 116. If no Mould Guide is available turn to the table of dimensions of anteriors on page 115. In the left hand column locate the number of the mould being used. In the column headed "Width of six anteriors, set up," learn the combined width of these lower anteriors. By means of the dimensions in the second and third columns, determine upon anteriors of the length and as much narrower as seem necessary. Order the desired teeth by means of the mould number which will be found on the same line in the column at the left.

In cases requiring anteriors much shorter than those regularly carded with the uppers, they may be found among Moulds 3B, 3C, 3D, 4B, or 4C.

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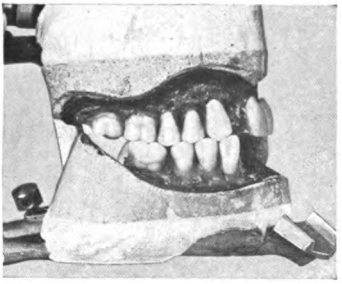

Fig. 183

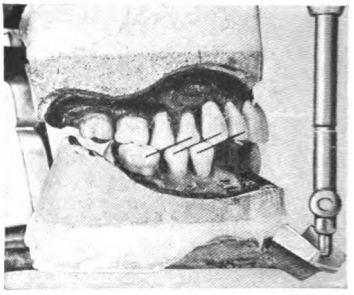

Fig. 184

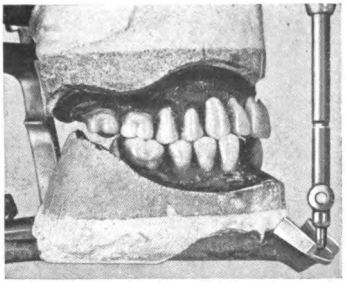

Fig. 185

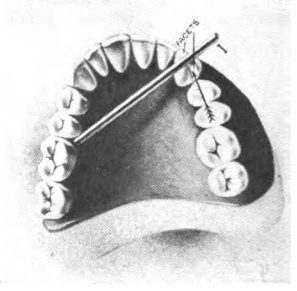

Fig. 186

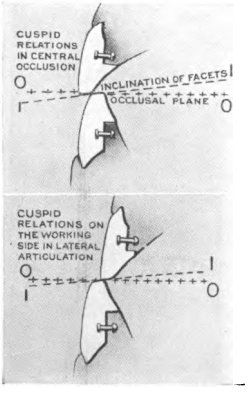

Fig. 187

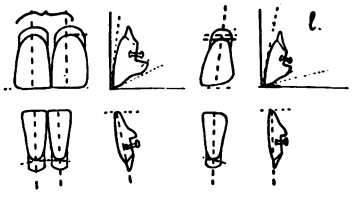

Fig. 188

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Arranging the Teeth.—The Cuspids.

Adjust the upper cuspid to the lower first bicuspid. It is generally necessary to grind the mesial slope of the buccal cusp of the lower bicuspid and the distal slope of the cutting edge of the cuspid to permit establishing correct relations.

The upper lateral adjoining the cuspid should be removed from its place without heating the wax, so that it can be easily replaced. This will facilitate articulating the lower cuspid, as in Figure 183.

Grind the mesial slope of the cutting edge of the upper cuspid to locate the tip of that tooth just anterior to the mesial contact point of the lower bicuspid. The facet thus established must not be inclined lingually, but must be at right angles to the long axis of the tooth. The tendency in grinding this facet is to incline it too steeply from the mesial to distal, making the cuspid too pointed and increasing the difficulty of articulating it with the lower teeth. The mesio-distal inclination of the facet on the mesial half of the tooth should be practically parallel to the mesio-distal inclination of the buccal cusps of the upper bicuspids, as shown in Figure 184.

Set the lower cuspid in position and grind the mesio-distal inclination of the distal half of the cutting edge, to be parallel to the inclination of the cutting edge of the mesial half of the upper cuspid as in Figure 185.

The facet on the mesial slope on the upper cuspid is to be ground to the lingual inclination shown by the outline in Figure 186, so that a straight edge placed in contact with the facet will touch the wax at the mesio-lingual cusp of the first molar. Grind the facet on the distal slope of the cutting edge of the lower cuspid to a labial inclination which is the complement of the lingual slope of the upper cuspid with which it occludes, as shown in Figure 187. The inclination of the long axis of each lower cuspid is also shown in Figure 187.

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In the upper part of Figure 187 the complementary inclination of the facets on the cutting edges of the cuspids is shown with the cuspids in occlusion. In the lower part of the Figure the cuspids are shown in articulation with the lower about to begin the return from an extreme lateral excursion. The complementary inclinations of the facets make it possible for the cuspids to remain in contact throughout these movements. This form of articulation by the cuspids is very important in maintaining the stability of the dentures and in protecting the upper laterals from breakage. If the lower cuspids are set to too deep an underbite, the dentures are almost sure to be tipped out of position by improper cuspid contacts; the force of the closure will be brought upon the thin edged laterals which are not fitted to stand it, and they will be broken from the plate. This form of improper contact is very apt to occur in finished dentures unless guarded against and is disastrous.

Replace the upper lateral but do not attach it. Move the articulator to produce the working and balancing relations and grind the mesial edge of the lower cuspid so that it clears the slope on the distal angle of the upper lateral as in Figure 185. The upper laterals and the lower cuspids should not come into contact in any movement of the jaw.

The facet on the cutting edge of the upper lateral should incline upward and backward more than that on the edge of the cuspid, as is shown in Figure 188. When this facet has been ground, articulate the lower lateral with it. Do not grind facets on the cutting edges of the lower incisors. Grind facets on the edges of the upper centrals to the inclinations shown in Figure 188 and articulate the lower centrals with them.

The lower incisors should be set with the necks directly over the ridge and the long axis of the teeth should be inclined as is shown in Figure 188.

Figure 185 shows the lower cuspid in occlusal contact with the upper cuspid but not with the lateral.

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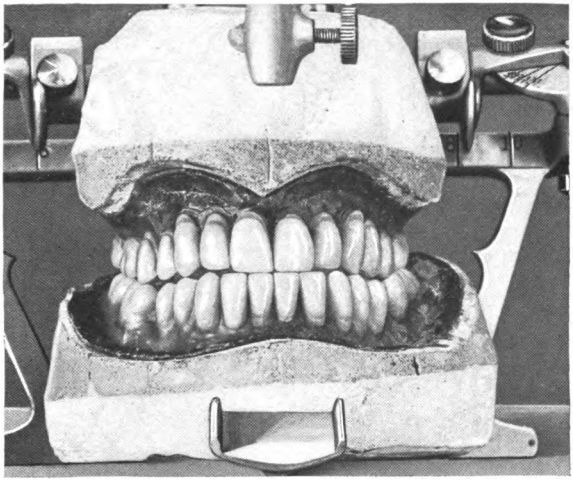

Fig. 189

Arranging the Teeth.—The Incising Bite.

Before trying the teeth in the mouth hold the articulator in the incising position shown above and slightly alter the arrangement of the incisors and cuspids if necessary so that they will come into proper contact.

The upper centrals should touch the lower centrals as shown. The upper laterals may, in certain arrangements, touch the lower laterals, but they should not touch the lower cuspids. All instances of broken laterals, not due to careless handling, which have come to the attention of the writers have been found to be due to a cuspid striking the lateral in the incising or the working bite.

The lower cuspids should touch the upper cuspids but not the upper laterals in masticating movements.

When the lower is in central occlusion the lower incisors and possibly the lower cuspids should not be in contact. The lower incisors should not be allowed to support the dentures in lateral protrusive movements but should share this strain with the bicuspids and the cuspids. The pressure on the cuspids should be heavier than on the upper laterals or the lower incisors.

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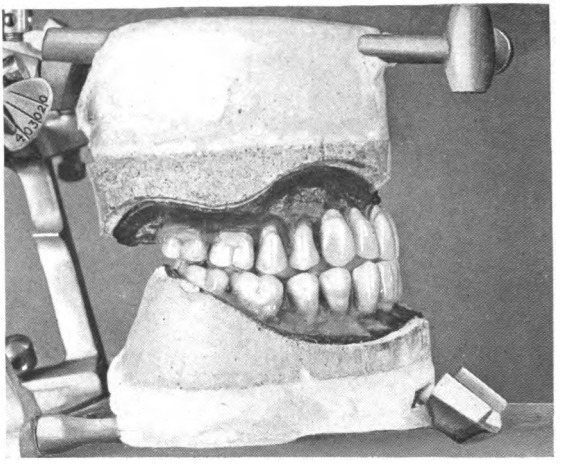

Fig. 190

The Incising Bite—Continued.

The danger of breaking the incisors in use of the denture will be eliminated if the foregoing instructions are observed and the errors seen in the finished denture are corrected by grinding with a stone while the dentures are examined for these contacts in the mouth.

The lower first bicuspid should be in contact with the upper cuspid which acts as a protector for the upper lateral and prevents the incisors from receiving any excessive strain. The tip of the cusp of the lower second bicuspid may touch the tip of the upper first bicuspid cusp but this is not essential. The tip of the upper second bicuspid should come into contact with the mesiobuccal cusp of the lower first molar. The lingual cusps of the bicuspids and molars also come into contact in the incising bite relation. Occasionally the lingual cusps will touch so heavily that the buccal cusps cannot come into contact. If any cusp rides so heavily on an opposing cusp as to prevent the teeth from coming into the proper relation with their antagonists, a little careful grinding will correct the trouble.

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Inspecting the Trial Dentures in the Mouth.

If the plane of occlusion has been correctly established and the bite correctly taken there remains only the necessity for determining whether the arrangement of the teeth especially the ten anteriors can be altered so as to improve the patient's expression and increase the natural appearance of the dentures. The most satisfactory results in this respect can only be obtained by placing the dentures in the mouth and engaging the patient in conversation or by having the patient read aloud while watching the appearance of the teeth and the patient's expression as the lips and mandible move.

The esthetics of tooth arrangement is largely a matter of art and hence no hard and fast rules can be laid down governing this work. The following suggestions may be found of assistance.

Most people expose all or nearly all of the length of the central incisor when the lips are retracted in a broad smile or in hearty laughter. The edges of the incisors in the feminine type usually parallel the curvature of the lower lip while in the masculine type they tend to parallel the straighter line of the upper lip.

The upper incisors normally show more than the bicuspids so that their tips appear to be set at a lower level than the tips of the bicuspids. In most artificial dentures the reverse condition exists.

The upper lip rarely comes in contact with the bicuspids when the lip is retracted in smiling; a space exists between the bicuspids and the lip during this action which casts a shadow over these teeth tending to decrease their conspicuousness.

The upper bicuspids are set so that they do not touch the lip when the patient smiles, the arch is narrowed, usually resulting in a marked improvement in speech. This arrangement of the upper bicuspids assists in giving stability to the lower denture by bringing the lower bicuspids more directly over the crest of the lower ridge.

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Inspecting the Trial Dentures in the Mouth—Continued.

When looking at the bicuspids of a patient whose lip is raised as in smiling, from a point directly in front of the patient, it will often be found that the amount of bicuspid showing depends largely on the type of the patient's face. The bicuspids are usually most visible in faces of the ovoid type and less visible in the mouths of patients who have square and oval faces and least prominent in faces that are markedly tapering in type.

The curve of the upper alveolar ridge in the bicuspid region may be used as an aid to getting the proper esthetic effect for the bicuspids by setting them to a curve that parallels the curve of the ridge.

In the instructions given for setting the anterior teeth the inclinations given were for the average case. At this time it may be possible to improve the patient's appearance by altering the inclinations of the various teeth to suit the requirements of the case presenting or to increase or decrease the prominence of the laterals or of the cuspids.

The lower anteriors should be kept over the crest of the lower ridge to let the lower lip fall to an almost vertical position. The upper centrals may be brought forward to carry the upper lip to a position where the upper lip is more prominent than the lower, which is normal.

Where conditions permit, the roll effect often seen on the lower lip can be had if the upper incisors just touch the inner edge of the lower lip when the mandible is at rest with the occlusal surfaces of the dentures slightly separated.

When the arrangement of the teeth has been accomplished in a satisfactory way soft wax may be added to the labial flanges of the upper and the lower dentures till the desired fullness of the upper lips and cheeks is obtained.

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Arranging the Teeth—Lower Second Molars.

The setting of the lower second molars is left till the last because they are the teeth principally affected when a steep compensating curve is developed, and requires most grinding. If set to a curve without proper grinding they may tend to influence the motion of the articulator and interfere with the correct manipulation of it.

When the "try-in" is complete and all relations are satisfactory, set the lower second molars and articulate them in the manner described for the other teeth. Occasionally the lingual cusps of the upper second molars will ride heavily in the disto-buccal grooves of the lower second molar in the balancing relation so that they interfere with the correct relations of the other teeth in articulation. This is especially apt to occur when a steep compensating curve is established. To correct this, use the inverted cone carborundum stone and deepen the disto-buccal groove of the lower molar and flatten the slope of the buccal incline of the lingual cusp of the upper second molar till the bicuspids and first molars of both sides assume correct relations.

When the Simplex articulator is used it is better to grind the lingual cusps of the upper second molar and the groove of the lower second molar so that these teeth cannot touch in the balancing bite relation rather than to permit them to ride too heavily.

The curve made by the occlusal surface of the lower molars and second bicuspids should be governed at least in part by the curvature of the posterior portion of the lower ridge. If the occlusal surfaces of the lower molars are set parallel to this section of the ridge, the force applied through the teeth in the act of masticating will be at right angles to the surface of the ridge, and the pressure will thereby seat the lower denture rigidly in place and will prevent a tendency of the lower to move. A lower ridge that has a great curve will call for a correspondingly great curvature in the arrangement of the molars and bicuspids.

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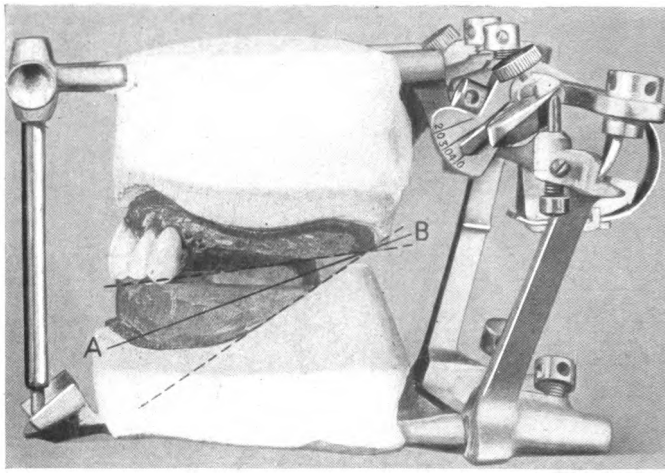

Fig. 191

Arranging the Teeth.—The Lower Second Molars—Continued.

In practice the curvature of the lower molars must be modified to meet the requirements of the upper set for stability. In many cases a curvature great enough to stabilize with the lower will tend to create a forward pressure on the upper which would dislodge it. If the upper ridge is flat, set the bicuspids and molars to develop a curve (b) which will be half way between the flatness of the upper (a) and the steepness of the lower (c).

Bear in mind that as the curve that is indicated in the Figures 163 and 164 is departed from the necessity for grinding increases.

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Part V

The Simplex Articulator

and

The Snow Face Bow

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The Simplex Articulator and Accessories.

Dentists who do not wish to use the Adaptable articulator will find the Gysi Simplex articulator satisfactory. It requires no measurements of patient's jaw movements and no adjustments. The rotation points are fixed in the positions necessary to reproduce the average downward and lateral inclinations of the condyle paths as carefully recorded by Prof. Gysi in 400 cases. The upper bow is supported by an Incisor Guide Pin as in the Adaptable.

The Simplex articulator is used by many dentists without the accessories, shown in Figure 192, but the use of the Face Bow and the accessories will enable them to avoid errors which might otherwise pass unrecognized and will result in a higher average of satisfaction to both patients and dentists than could be achieved without their use. The average time required by the technic to be described, about 30 minutes when the technic has been mastered, is negligible as compared with the time which would be lost if unrecognized errors necessitated remaking the case.

The use of the Snow Face Bow enables the dentist to mount the impressions and bites in the same relation to the centers of motion in the articulator that they occupy to the centers of motion of the jaw.

The supreme importance of taking correct bites justifies the use of the Incisor Path Marker and the Horseshoe Plate and the Slip Joint Stem.

Building Separate Bite Plates.

If the impressions are not to be used for taking the bites, it will be necessary to pour casts as described for Figure 132, to shape over them base plates as described for Figure 151, to build a bite rim upon the upper base

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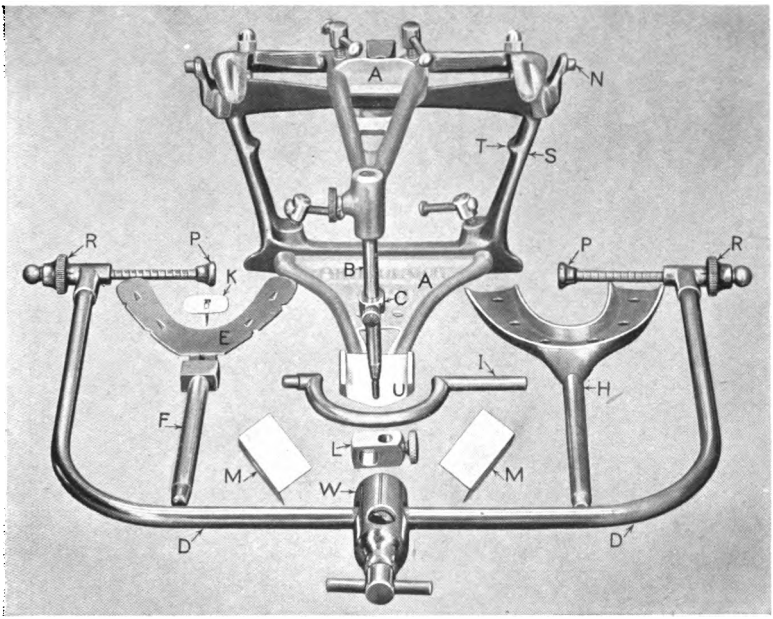

Fig. 192

THE GYSI SIMPLEX ARTICULATOR OUTFIT COMPRISES

A Gysi Simplex Articulator "A" composed of 1 Articulating Frame, in two parts, 1 upper and 1 lower Model Support, 1 Straight Incisor Guide Pin "B", two Face Bow adapters of the articulator "N". An Incisor Guide incline "U".

An Incisor Guide "C" for mounting casts on the articulator when the Face Bow is not used.

A Snow Face Bow, "D" with condyle rods "P P" and lock nuts "R R" and a Cylindrical Block "W".

A Horseshoe Plate "E" and Slip Joint Stem "F". The Horseshoe Plate is used with the Incisor Path Marker to obtain correct bites. The Slip Joint Stem connects the Horseshoe Plate with the Face Bow.

A Mouth Piece for the Face Bow "H" used only when mash bites are taken.

A Curved Incisor Guide Pin, "I" used only while mounting casts with the Face Bow.

An Incisor Path Marker, "K" used with the Horseshoe Plate for determining correct bites.

An Anterior Supporting Block, "L" to support the front of the Face Bow when mounting casts.

Two Bite Lock Trays "M" for locking bites together.

plates, adapting the technic described for Figure 155, to take the bite with base plate bite rims, using the technic described for the impression bite rims beginning on page 137.

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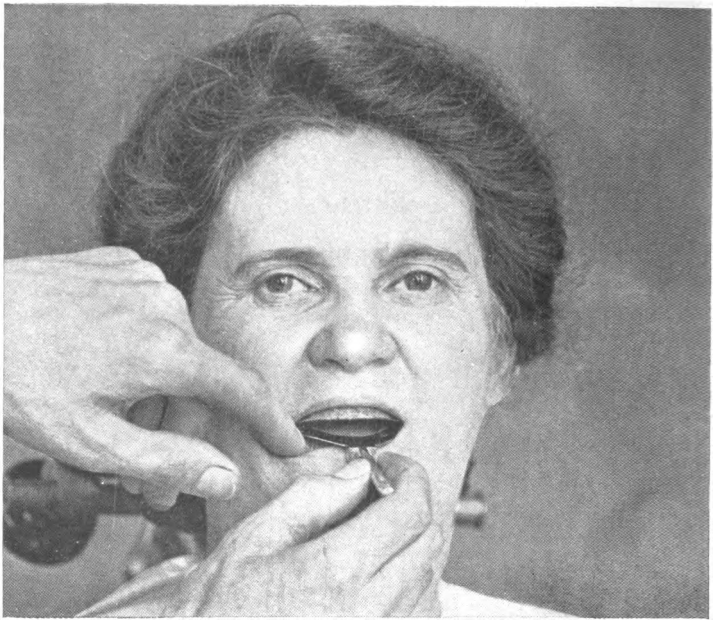

Fig. 193

Attaching the Horseshoe Plate.

Both bites are in the mouth. Attach the horseshoe plate to the slip-joint stem and hold it so that the pins rest upon the occlusal surface of the lower bite rim and about ½ inch of the Horseshoe Plate projects in front of the upper bite rim when it is closed upon the lower. See that the Slip Joint Stem projects forward, about in the median line. Have the patient close and impress the points of the pins on the occlusal surface of the lower. Remove the Horseshoe Plate and lower bite rim. Detach the Slip-Joint Stem and set the Horseshoe Plate on the lower bite rim as described for Figure 108. Equalize the biting strain as described for Figure 109. Attach the Incisor Path Marker to the upper bite rim as described for Figure 113. Make the crosses on the face as described for Figure 106.

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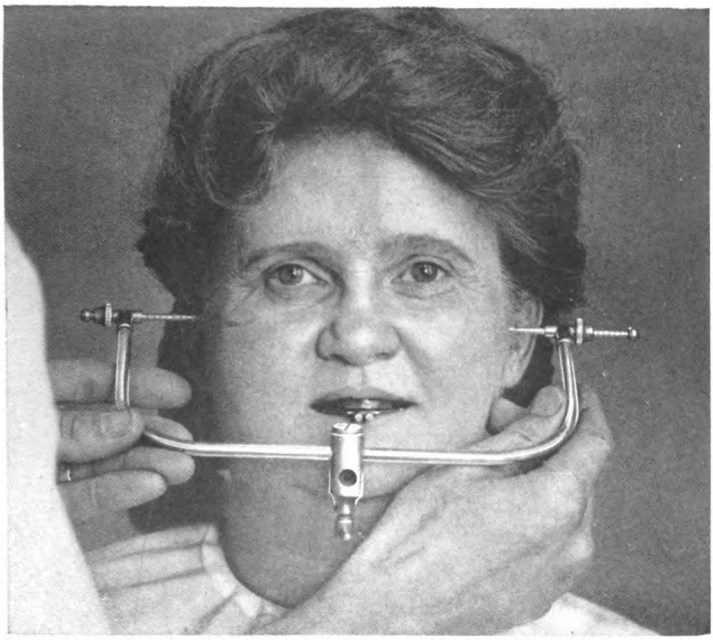

Fig. 194

Adjusting the Face Bow to the Face. Part 1.

Push the right condyle rod as far inward as it will go and lock it there. Place the inner end of this condyle rod over the intersection of the lines over the right condyle. Push the other condyle rod gently but firmly against the face, with its inner end over the left condyle, and lock it there.

Count the notches external to the sleeve of the lock nut on the condyle rod on the patient's left. Remove the Face Bow from the face. Divide the number of notches which were external to the sleeve of the lock nut on the left by 2. Adjust each condyle rod so that half of the total notches exposed on the left rod are external to the sleeve of each lock nut, when the nut is tightened. This insures centering the Face Bow when it is replaced upon the face.

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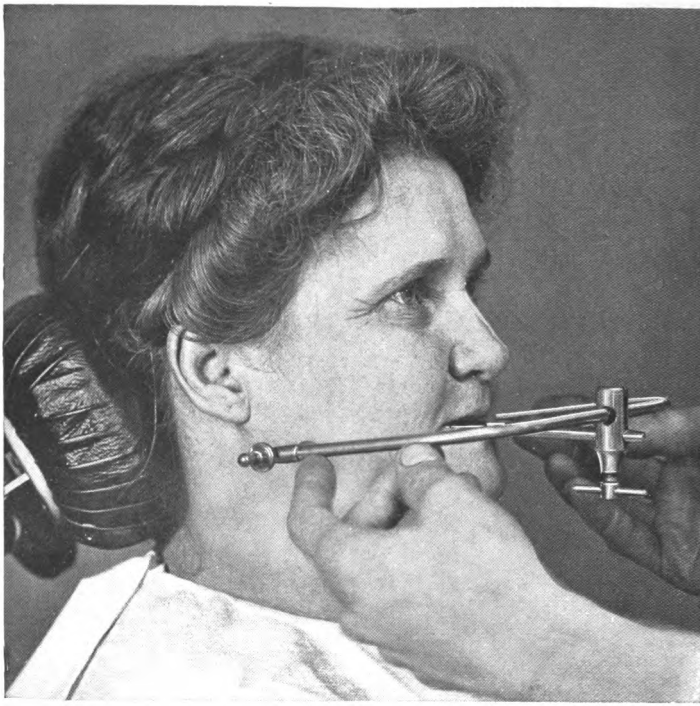

Fig. 195

Adjusting the Face Bow to the Face. Part 2.

Carry the Face Bow to position on the face, beginning with the condyle rods at the level with the angles of the jaw as shown in Figure 195. Move them upward and slightly backward to their positions over the crosses. The pressure exercised upon the face by the condyle rods should be sufficient to aid in holding them in position, but should not be painful to the patient. If only a slight adjustment of the condyle rods is necessary to achieve this effect, it can be made on one side. If much adjustment must be made, it should be divided between the two sides. Lay the Face Bow aside until the incisor path record has been taken. Take this record as described beginning with Figure 115.

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Taking the Incisor Path Record.

Attach the Incisor Path Marker to the labial surface of the upper bite rim in the median line, in such position that when the spring controlling the pin is released only the cone of the Marker projects below the incisal edge, as illustrated in Figure 113.

Blacken the anterior portion of the upper surface of the Horseshoe Plate as described for Figure 114, and lightly coat it with wax. Place the lower impression and Horseshoe Plate in the mouth and make the incisor path record as described for Figure 115. When the jaw is at rest and the point of the Incisor Path Marker is in the point of the incisor path record, the bite is correct.

While the point of the Incisor Path Marker rests in the anterior point of the incisor path record, make vertical marks across the buccal surfaces of both bite rims as illustrated on the left in Figure 125. Lock the pin of the Incisor Path Marker in a raised position. Deepen the vertical line across the buccal surface of the bite rim into notches as illustrated on the right in Figure 125.

While the use of this incisor path record in connection with the Simplex articulator does not permit of any adjustment of the articulator to reproduce habitual jaw movements, it is invaluable because it is the only known means of determining accurately when bites are correct in all horizontal relations. This is one of the steps where what appears at a casual glance to be a waste of time will generally prove, in the end, to be an economy of time, because of the avoidance of errors otherwise undetectable. It will be well to review what has been offered in connection with the taking of the bite by this method on page 140.

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Fig. 196

Adjusting the Face Bow to the Face. Part 3.

With both bite rims and the Horseshoe Plate in the mouth, and with the point of the Marker in the point of the incisor path record, place the Slip Joint Stem upon the rods of the Horseshoe Plate. Insert the outer end of the Slip Joint Stem into the hole of the cylindrical block on the arch of the Face Bow. Pass the Face Bow about the face in the position shown in Figure 196 and move the condyle rods upward and backward to their positions over the crosses. Hold the Face Bow in this position and lightly set the lock screw of the cylindrical block. Examine on both sides of the face and make sure that the condyle rods of both sides are over the crosses. Then lock the set-screw of the cylindrical block so firmly that no change in the relation of the Face Bow to the bite rim can occur during the following manipulation.

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Fig. 197

Removing the Face Bow.

Loosen the lock nuts of the condyle rods and move them outward, away from the face as shown here. Place the thumb and first finger on the opposite sides of the anterior margin of the Horseshoe Plate with the hand below the Face Bow as shown. Place the inner side of the tip of the third finger against the face side of the cylindrical block and press it upward while pinching the sides of the Horseshoe Plate. This action will force the Slip Joint from the Horseshoe Plate. Lay the Face Bow aside until it is needed for mounting the cast upon the articulator. Take the bite lock impressions as described for Figure 126. Prepare impressions for making casts and make the casts as described, beginning on page 155. Fasten the bites together with the Bite Locks as described for Figure 138.

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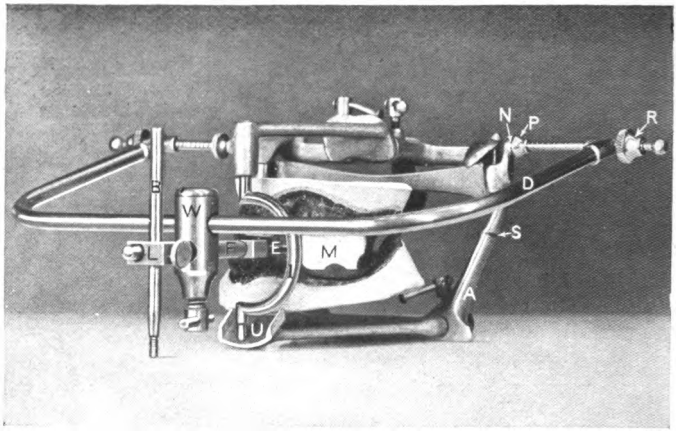

Fig. 198

Mounting Casts on the Simplex Articulator With a Face Bow. Part 1.

The articulator is here shown with the bite rims fastened together by the Bite Locks "M" and mounted on the Horseshoe plate "E" and the Slip Joint Stem "F" which passes through the cylindrical block of the Face Bow "W". The Condyle Rods of the Face Bow "P" are over the Face Bow adapters of the articulator "N". The Curved Incisor Guide Pin "I" is in place. The Anterior Supporting Block receives both the Slip Joint Stem "F" and the Straight Incisor Guide Pin "B" and its set screw is locked to support the Horseshoe Plate and Slip Joint Stem parallel with the table. The notch "S" on the frame of the articulator locates the proper level of the occlusal plane when the Face Bow is not used.

The technic for mounting bites and casts on the Simplex Articulator by means of the Snow Face Bow is given on the next page.

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Mounting Casts on the Simplex Articulator With a Face Bow. Part 2.

The Simplex articulator is a little wider than the articulator for which the Face Bow was designed. It is therefore necessary to arrange the condyle rods to accommodate this additional width. This may be done by setting both condyle rods in the Face Bow in such way that one notch and half the distance to the next one is external to the sleeve of the lock nut, or by adapting it to the articulator in the same way that it was adapted to the face in Figure 196. Tighten the lock nuts.

Replace the straight Incisor Guide Pin with a curved Incisor Guide Pin and see that the top of the pin is flush with the top of the sleeve in which it is held. Lock it in this position. If base plates and bite rims were used for taking bites instead of the impression bite rims, tie the casts into the base plate bites which are already mounted on the Horseshoe Plate and set the pins of the Horseshoe Plate firmly into the Slip Joint Stem of the Face Bow. Spring the inner ends of the condyle rods over the Face Bow Adapters (cylindrical projections on the articulator external to the heads of the condyle pins).

The anterior part of the Face Bow must be supported so that the occlusal plane of the bite rims is parallel to the flat surface on which the articulator rests. This may be done by means of an improvised stop for the cylindrical block of the Face Bow or by means of the Anterior Supporting Block shown in Figure 198. The projecting end of the Slip Joint Stem is placed through the large hole in the Anterior Supporting Block and the straight Incisor Guide Pin of the articulator is placed in the other hole. When the Slip Joint Stem is parallel with the top of the table tighten the set-screw of the Anterior Supporting Block, which locks all the parts in that relation.

Attach the casts to the model bows using the technic described for Figures 139, 140 and 141.

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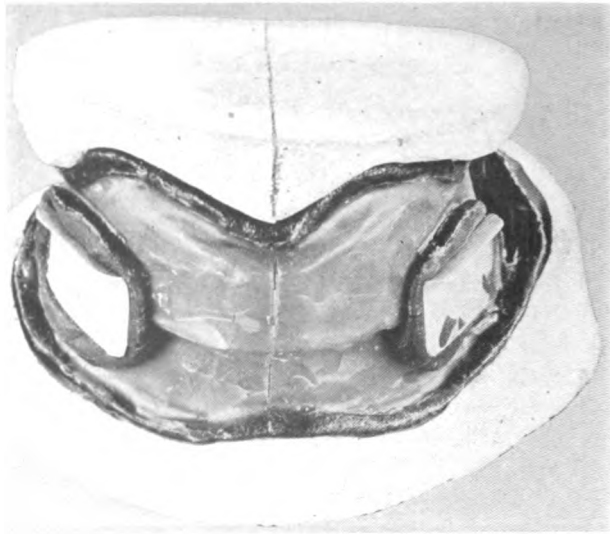

Fig. 199

Mounting Casts on the Simplex Articulator Without the Face Bow.

Dentists who do not wish to employ the Face Bow may mount casts upon the Simplex articulator without it, but probably not with the same freedom from error as when the Face Bow is used.

If a line from the center of the vault be prolonged up the back of the upper cast and one from the frenum be prolonged up the front of it and these be joined by a line along the top of the cast, as shown in Figure 198, it will be easy to center the cast laterally under the upper model bow. The antero-posterior position of the bite rims should be such that the incisal edge of the upper bite at the median line will be about ½ inch back of the posterior side of the Incisor Guide Pin.

Lock the straight Incisor Guide Pin in the articulator so that its top is flush with the top of the sleeve by which it is held. Place the Incisor Guide on the Incisor Guide

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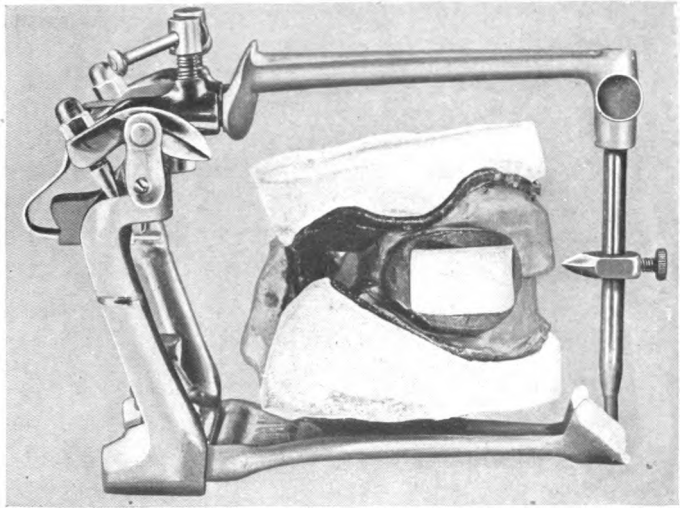

Fig. 200

Mounting Casts on the Simplex Articulator Without the Face Bow—Continued.

Pin with its point facing directly backward in the median line and lock the set-screw into the depression in the straight pin. Place an elastic band around the set-screw of the Incisor Guide and in the notches on the outside of the vertical part of the articulator frame "S", Figure 192. The occlusal plane of the bite rim should be on a level with this band.

Place a soft mass of carding wax on the top of the lower model bow and press the lower cast down upon it until the occlusal plane of the bite rim is level with the elastic band, and the incisal edge of the upper bite rim at the median line touches the point of the Incisor Guide or is about ½ inch back of the posterior surface of the Incisor Guide Pin, and adjust the casts till the line across the top of the upper is beneath the centre of the upper bow. Attach the cast to the articulator by the technic described for Figures 139, 140, 141.

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Face Bow Technic for Large Cases.

The Simplex articulator is built on the average of a great many cases and is therefore smaller than the larger cases that present. This difference will be apparent on large cases only when the Face Bow is used, and may be overcome by the following technic.

Adjust the Face Bow as if the case were of the average size. When the Face Bow is locked in the proper relation to the face remove it without loosening the adjustment and apply it to the articulator, in which the curved pin has been placed. If the posterior end of the Slip Joint Stem (or the rim of the bite portion of the mouthpiece, when that is used) is not slightly distal to the rear of the straight sections of the curved pin, the casts will be mounted too far forward in the articulator to permit of correct manipulation. To make the proper adjustment note the distance between the rear edge of the block of the Slip Joint Stem and the distal surface of the straight sections of the curved pin. Make a short line on the side of the face extending forward from the intersection of the lines marking the condyle location and parallel to the plane of occlusion. Space off on this line a distance equal to that noted when examining the relation of the Slip Joint Stem to the articulator pin. Make a similar line and space off an equal distance on the opposite side of the face. Readjust the Face Bow to the new marks and proceed as usual from this point.

Fig. 201

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Part VI

Flasking, Vulcanizing, Finishing and Perfecting the Fit

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Fig. 202

Preparation of Trial Dentures for Flasking.

Part I.

Place the trial dentures correctly on the casts and attach by heating the edges. Remove loose teeth one at a time, thoroughly dry the teeth and wax and firmly reset the teeth.

Wax the labial and buccal surfaces adjacent to the teeth to a greater fullness than desired in the finished denture to permit of finishing and polishing. No wax should be added to the Dentsply Baseplate Composition that covers the palate of the upper as this material is of the proper thickness to produce a thin, strong palate of uniform thickness in the denture.

It is best to have the buccal surfaces of the lower convex where possible, especially in the molar region. Concave surfaces tend to make it difficult for the tongue to sweep food forward to a position where it can be carried onto the occlusal surfaces of the teeth for mastication.

Fill the interproximal spaces with wax but not enough to permit the teeth to be dislodged in packing. Wax should be added, where necessary, in a plastic condition and worked to the proper contour with a moderately warm spatula. Fluid wax may warp the trial denture or draw teeth out of position on cooling.

Do not carve finished gum festoons or flow the surface of the wax smooth. This may cause the wax to change form and derange the articulation. Final contouring and festooning is easily done with a vulcanite finishing bur as described later.

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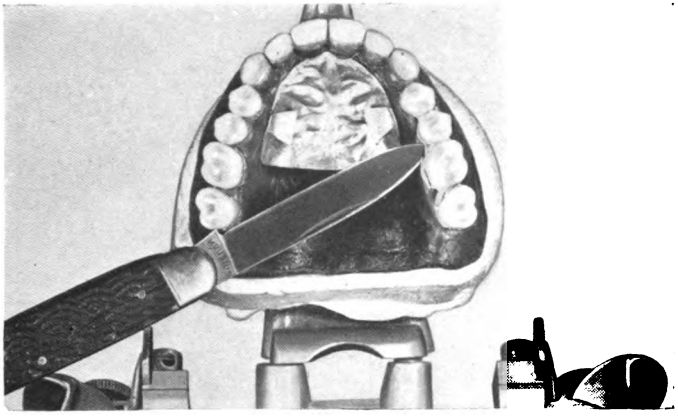

Fig. 203.

Preparation of Trial Dentures for Flasking, Part II.

This illustration shows the tin piece to reproduce the rugae in place, and the wax in which the incisors and cuspids are held, carved so that the rubber will imitate the full natural contour of the lingual surfaces of these teeth, both of which greatly assist in articulation of words.

When the wax is left thick at the point where it is being cut by the knife, polishing the vulcanite is made easier.

The extra thickness of Dentsply Baseplate Composition across the heel should now be cut away.

This illustration shows that the extensive grinding necessitated by the rather unusual inclinations of the condyle paths in this case has not altered the forms of the teeth, and their masticating power has not been reduced. The secondary cusps have not been destroyed and they are in position to permit the establishment of the numerous small, sharp-edged facets essential to efficient mastication with the limited power it is possible to exercise through artificial dentures.

The final grinding in the mouth will be illustrated later.

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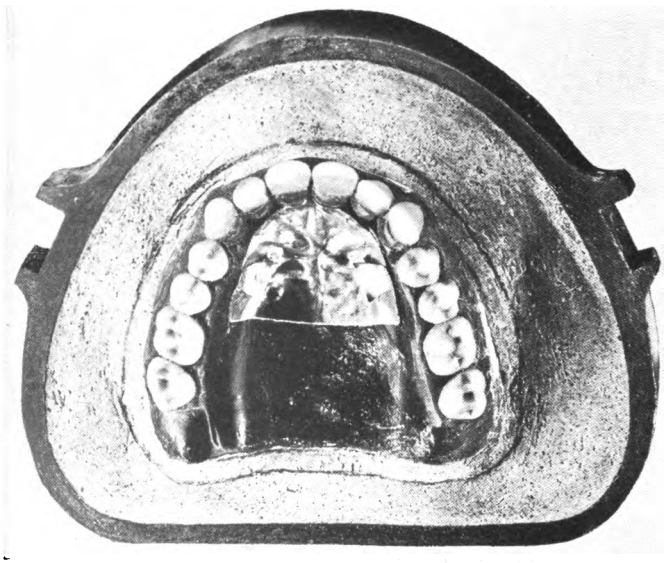

Fig. 204.

Flasking the Dentures.

Fill the cup portion of a B.D.M. Co. flask, No. 22C, with equal parts of Spence plaster and plaster of Paris, mixed thick. Imbed the cast in it until the outer edge of the extension left on the cast is about level with the flask rim. Shape the investing plaster as shown in the illustration. When the plaster is hard draw on it a pencil line extending entirely around the cast so that it will everywhere be 1/8 inch distant from the wax or baseplate. Coat the surface of the plaster with thin Sandarac to act as a separating medium.

Make a second mix of equal parts of Spence plaster and plaster of Paris but not so thick as the first. With a small spatula work some of it carefully into the crevices between the teeth, as illustrated on page 229. Then cover the entire wax trial plate and the teeth. Clean the rim of the cup portion of the flask, place the ring in position

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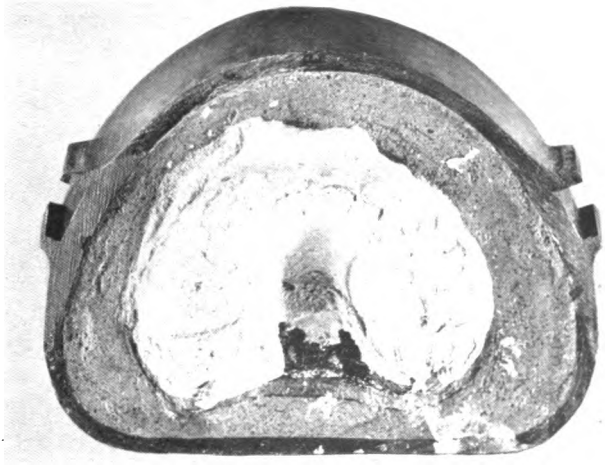

Fig. 205.

Flasking the Dentures, Continued.

upon it, and fill the ring with the remainder of the second mix. Seat the lid. Do not let any plaster escape between the cup of the flask and the ring. Place the flask in a Donham clamp or under a weight until the plaster sets. Immerse the flask for 15 minutes in a dish containing about 2 quarts of water at 118-120° F, when the wax will be soft enough to permit opening the flask without danger of breaking the cast. If the baseplate sticks to the cast, soften it by directing a bunsen flame upon it.

A small colander with fine perforations in the bottom will be found convenient for holding the flask while washing the wax away from the cast and the teeth. To prepare for washing away the wax, add carbonate of soda, usually known as washing soda, to actively boiling water in proportion of one tablespoonful to two quarts of water. This mixture cuts wax much more readily than plain water and leaves the teeth very clean. Hold the colander above the vessel in which the mixture is boiling. With a small dipper pour some of the boiling solution over the surface to be cleaned.

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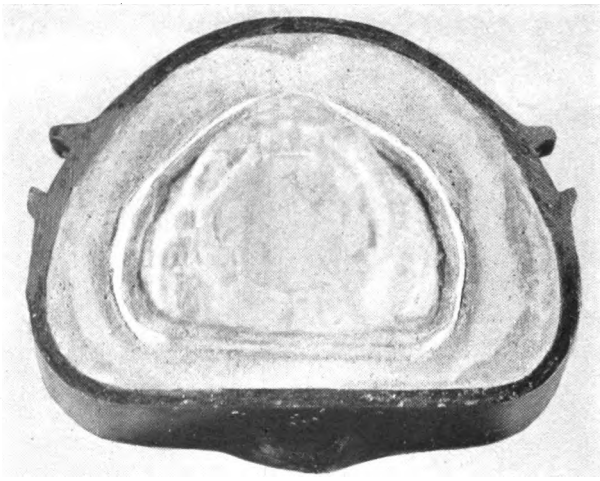

Fig. 206.

Preparation of Channel for Waste Rubber.

This illustration shows a section of a flask with a channel cut for receiving the surplus rubber.

The narrow band of plaster left between the space filled by the rubber and the channel facilitates the escape of surplus rubber and the closing of the flask in testing for quantity; and keeps the rubber under pressure, retaining in the denture expanding rubber that would escape through waste gates during the initial period of vulcanizing.

In the last period of vulcanizing, the rubber loses volume and draws away from the teeth, leaving spaces where fluid food may lodge. The Snow waste channel will minimize error caused by this change.

The waste channel is cut with a Kingsley scraper up to the pencil line shown on page 228, leaving a strip of plaster from 1/16″ to ⅛″ wide between the rubber space and the channel. The channel may extend outward to the metal flask rim and should be about ⅛″ deep at its centre, sloping up toward the narrow plaster rim and the edge of the flask from this point.

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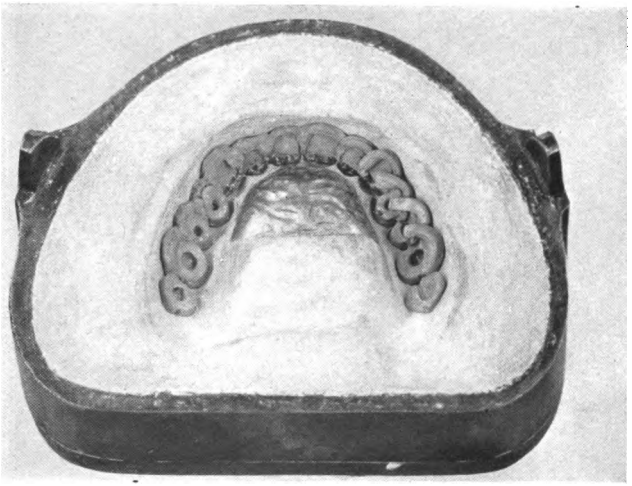

Fig. 207.

Packing and Testing, Part I.

Heat slowly the portion of the flask containing the teeth until the teeth become so hot that the fingers cannot be held upon them. Fold one end of a sheet of pink rubber to make a strip ½ inch wide and of double thickness. Cut this strip crosswise into pieces ½ inch long and a little less than ⅛ inch in width. Place one end of one of these strips in each interproximal space beginning at the distal side of the first molar. Allow the balance of the strip to extend vertically upward. When strips have been placed between all of the teeth up to the mesial of the opposite first molar, return to the first one placed and bend it around the gingival margin of the tooth into the next approximal space ahead of it. Repeat this until the pieces take the position shown on the right side of this figure. Pack these pieces of pink rubber around the necks of the teeth as shown on the left above.

Cut strips of baseplate rubber about ⅛ inch wide and pack the diatoric holes of the posterior teeth and around the pins of the anterior teeth until they are covered.

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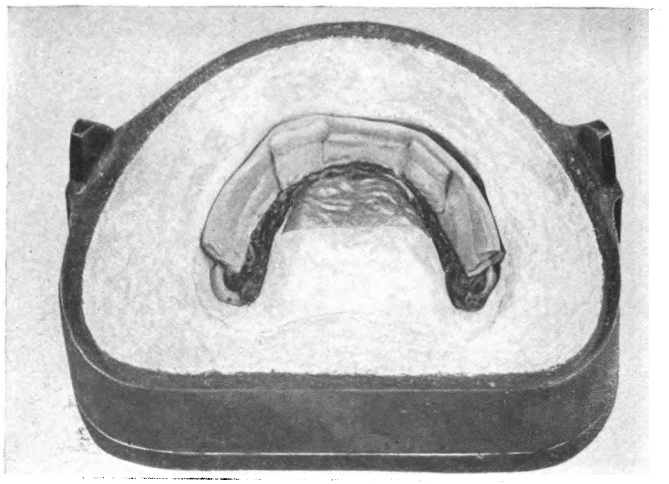

Fig. 208.

Packing and Testing, Part II.

The balance of the sheet of pink rubber is now folded longitudinally and cut lengthwise into three strips of equal width. Then lay a strip of pink rubber of double thickness against the buccal and labial sides of the flask on top of the pink rubber already in place, as shown above. Short pieces cut from the end of the strips of pink rubber may be placed over the lateral and cuspid region or wherever very bold contouring is to be done, to give additional thickness.

Strips of base rubber of about ½ to ⅝ inches in width are now laid over the palatine area. Do not place any pieces of base rubber to overlie the pink until the packing has been tested.

To test, place a thin piece of moistened percaline or cambric over the hot soft rubber; place the cast section on the flask, put in a small flask press and very slowly and cautiously bring pressure to bear on the flask contents, following the yielding rubber slowly with pressure so that the evils of rapid closing may be avoided.

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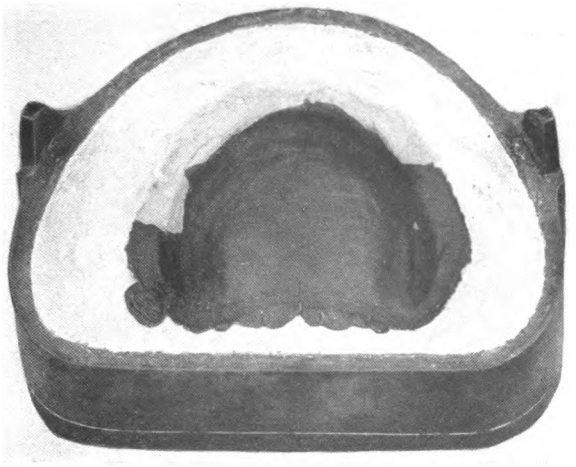

Fig. 209.

Packing and Testing, Part III.

When much pressure is needed to completely close the flask or when the sections of the flask come into contact, open the flask and examine the contents and either add more material or remove the surplus as indicated. Replace the percaline and place in the press and boil for fifteen or twenty minutes.

Carefully close the press until resistance is great enough to require strength to close the sections, then open and repeat the cutting away process until the sections of the flask come almost into perfect contact all around, being separated at most by only enough space to accommodate the thickness of the percaline. Then finally close and place in the Donham clamps shown in the illustration on the next page, preparatory to vulcanizing.

If the test percaline sticks to the rubber a syringe full of hot water squirted over it till wet, will make it easy to remove.

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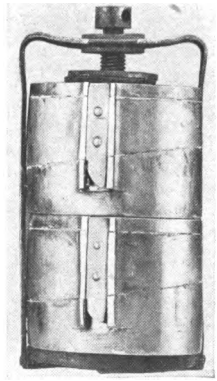

Fig. 210.

Vulcanizing and Opening the Flasks.

The following plan of vulcanizing yields good results. Put about four ounces of water into the pot of a 4½" three case vulcanizer. Invert the flasks and the clamp and place in the vulcanizer and close it. Adjust the temperature regulator to hold the temperature at 270° or 280° F. Heat the vulcanizer with the blow-off open till steam escapes, then shut the blow-off and let the vulcanizer run for three-quarters of an hour. Now move the temperature regulator to hold a temperature of 305° F. and continue the vulcanizing for one hour and fifty minutes.

If possible let the vulcanizer cool slowly. Do not open the blow-off valve to hasten the cooling. If this is necessary to hasten cooling immerse the pot of the vulcanizer in cold water.

The dentures must be carefully removed from the flasks to prevent breaking teeth or so cracking them that they will break later in the mouth. Do not hammer the flasks. This bends the flasks out of shape and the shock of the blows transmitted to the teeth may crack them. Cut away the plaster on the bucco-labial surface of the denture until the bottom of the flask is reached, when the denture may be safely released.

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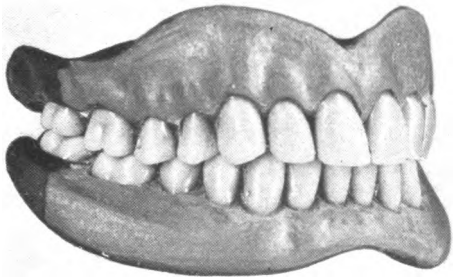

Fig 211.

Preparing Dentures for Polishing, Part I.

A series of casts of mouths exhibiting bold festooning and including the incisors and bicuspids, will be found to be of great assistance in imitating natural festooning.

The festooning of the vulcanite should be much bolder than the finished result expected as the contour will be much softened in polishing.

With the file remove the surplus vulcanite at the margins of the denture after brushing away the plaster which adheres to the denture with a three row stiff bristle brush. The beveled chisels are next used to carve away the vulcanite to the desired gingival outline, on both the bucco-labial and lingual surfaces, cutting at right angles to the tooth. Vulcanite burs are then used in a hand piece to carve the rubber to the required contour. By using the bur with light pressure and a drawing motion as it cuts, the carved surface will be left smooth enough to polish. A new sharp bur is best adapted to rapid cutting and one that is worn is best suited to finishing. Small depressions, that the large bur will not reach, may be carved with a large rose bur. The interproximal spaces are freed from the fins of rubber which project between the teeth with the needle-pointed bur revolving rapidly in the hand piece.

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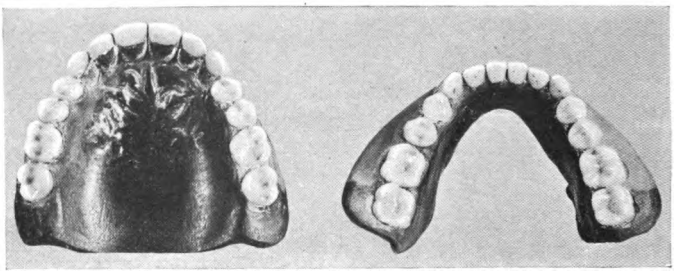

Fig. 212.

Preparing Dentures for Polishing, Part II.

With the square and beveled chisels, round the edges of the gingival festoons which were left square. If the lingual contour of the natural teeth is to be reproduced in the vulcanite these surfaces should be carved to the proper shape with the chisels which should be very sharp. Finally, go over the curved surfaces with chisels and make these surfaces so smooth that they will require only brushing with pumice to be ready for the final polish.

The flanges of the dentures should be carved to a round or cylindrical contour and not left sharp or very thin.

All small nodules or projections on the inside of the dentures should be removed with a small Kingsley scraper but this surface should be only cleaned with a brush and not polished.

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Polishing

Mix one part of emery powder with from six to ten parts of pumice and place the whole in a shallow pan with sufficient water to render the mixture quite fluid. Place a single-row stiff bristle brush on the lathe spindle, and, starting with the gingival festoons, finish these to a surface smooth enough to polish; follow this by finishing the lingual surfaces of the anterior teeth.

In reaching into the fine depressions at the gingival of the buccal surfaces and on the lingual of the upper teeth, the denture may be held so that the bristles of the revolving brush will strike the tooth and glance from it to the surface to be polished travelling in the direction of the depression to be finished. Do not allow the bristles to run long enough in one place to cut a channel. Next finish the lingual interproximal spaces between the bicuspids and molars, and then the main portions of the buccal and lingual surfaces, using the rag wheel and a small felt cone to reach places that the rag wheel will not touch.

A rotary motion should be imparted to the denture when it is being dressed on the rag wheel and plenty of the pumice mixture should be used to keep the denture wet. If roughness is detected in the interdental spaces a sharp chisel should be used to plane these rough places smooth preparatory to a second dressing with the bristle wheel.

For the glossing, place the flannel wheel on the lathe and hold a cake of Sure Shine against it for a second or two, then hold the denture in light contact with the wheel while it revolves rapidly, alternately pressing the denture into the surface of the wheel and withdrawing it while at the same time working hands in a rotary direction.

The dentures should be coated with vaseline or kept in water till ready for inserting in the mouth. This minimizes danger of warping.

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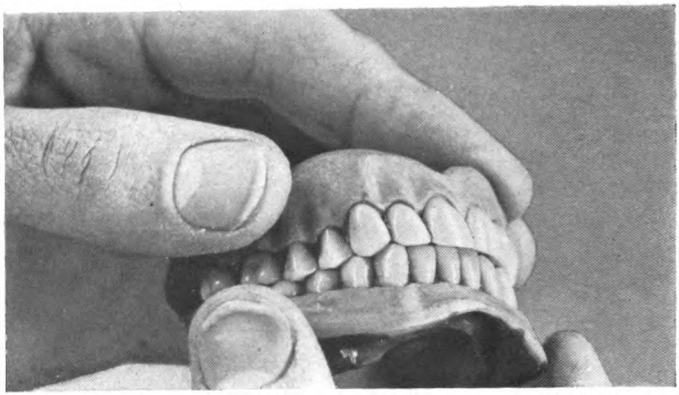

Fig. 213.

Testing Occlusion for Rocking.

Hold the upper and lower dentures in occlusion and test them to see whether the change in vulcanizing has been sufficient to cause the lower to rock on the upper. The dentures are held in occlusion with pressure applied alternately in the cuspid and molar regions. Locate and correct the points of improper contact. Cautiously grind these points with a small inverted cone carborundum stone.

The inclined planes of the buccal cusps of the lower bicuspids will usually be found to hit the inclined planes of the lingual cusps of the upper bicuspids too heavily. When this occurs grind both of the offending cusps slightly in such way that the bite will be deepened and not made more shallow.

Examine the lower denture and cut away all projecting portions of rubber which fit into undercuts in the contour of the lower ridge. If these projections are not removed from the denture they will prevent the lower jaw from taking the correct bite relation. When the lower denture has been well prepared to receive a wafer of compound it will flare like a V with no projecting portions to interfere with the smooth, even slope of the sides.

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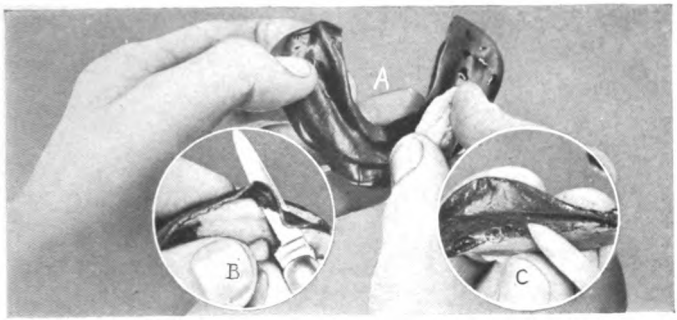

Fig. 214.

Refitting the Lower Denture, Part I.

Take a cast of an average size lower jaw that has a fairly high medium thin ridge and mould over it a wafer of Perfection compound which has been softened in water at 115° to 118° F. Do not thin the wafer in moulding. Trim away the surplus material till only a little more than is needed to cover the under surface of the denture remains.

Warm the blank and with bibulous paper or absorbent cotton moistened in the hot water, press the blank against the flanges of the denture and adapt the compound well to the contour of the denture as at "A". Trim away the surplus material at the margins with a sharp knife as at "B". Chill the blank in cold water and remove it from the denture. Dry the denture and the blank thoroughly. Place the dried blank in the dried denture and seal the margins of the compound to the denture with a hot wax spatula, pulling the soft compound toward the margins of the flanges in the operation as at "C". The entire margin of the compound must be thoroughly sealed to the denture so that moisture cannot penetrate between the denture and the compound and interfere with the compound adhering to the rubber.

This part of the technic may be finished in the laboratory.

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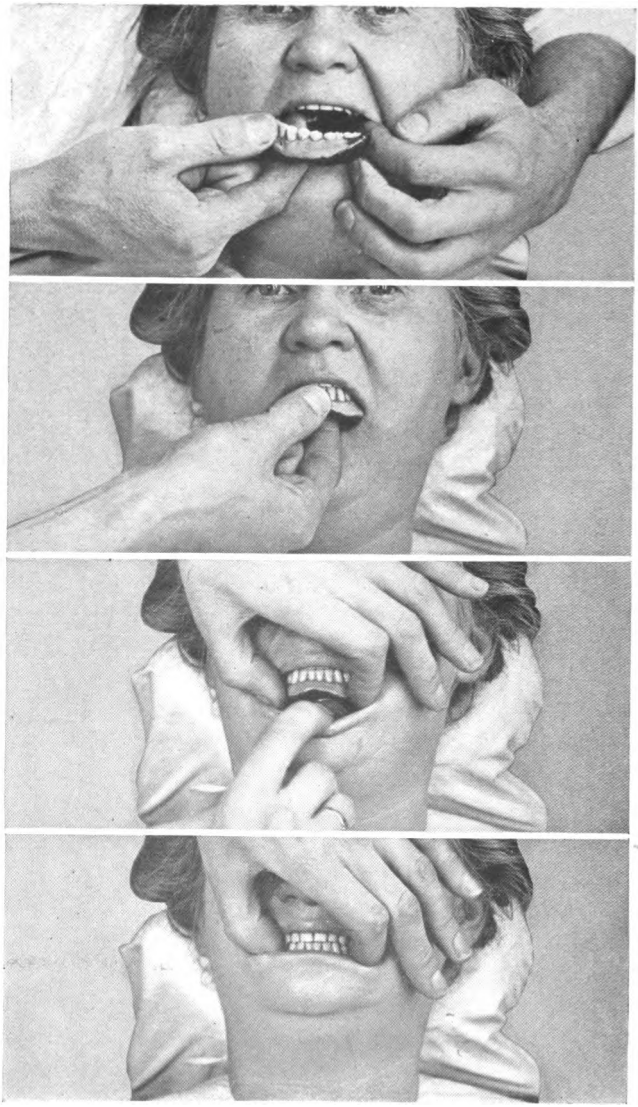

Fig. 215.

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Refitting the Lower Denture, Part II.

It is important to the success of the work that the positions of the fingers shown in the illustrations on the opposite page be closely imitated. It is important also to practice the following steps with the lined denture cold.

Place the upper denture in the mouth. With a stick of cocoa butter grease the palm side of the joint of the first finger of the right hand. The water in the heater should be maintained at a temperature of 150° F. With a water syringe that has a 1/16 inch opening, or a hot pouring cup, direct a stream of the hot water upon the compound of the lower denture so that the deeper portions of the impression will receive the most heat. The margins of the flanges should be heated only slightly. Continue the pouring or heating for about six seconds or for a sufficient length of time to soften the compound slightly. Grasp the denture between the thumb and first finger with the ridge surface facing the palm of the hand.

Place the lower teeth in the correct occlusal relation to the upper and hold in this position while the thumb and forefinger of the left hand are placed in contact with the buccal flange of the lower in the bicuspid region in such a manner that the lower will be held firmly in contact with the upper denture.

When the left hand is placed so that the lower denture is securely held against the upper, release the thumb of the right hand from contact with the lower and turn the right hand palm down. The index finger of the right hand is now used to pull the lip outside of the thumb and first finger of the left hand, so that the lip will not interfere with the smooth closing of the lower jaw that is necessary if the bite is to be taken correctly. (If the margins of the compound have been heated too much there is danger of tearing them loose from the denture at this time.)

Now direct the patient to place the tip of the tongue

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against the rear portion of the upper vault and slowly close the lower jaw till the ridge makes an imprint in the soft compound on the bottom of the lower denture. As the ridge of the jaw approaches the point where it touches the compound it will press against the thumb and finger which hold the lower denture against the upper at the point where they extend slightly under it. Allow the upward pressure of the ridge to force the fingers and thumb upward while they still maintain a firm pressure on the denture to keep it seated against the upper.

When the mouth has been closed the fingers should be removed and the patient instructed to suck while continuing the biting process. Chill the compound with cold water and remove the denture from the mouth. Chill it thoroughly by immersing in cold water, then place in the mouth and examine to see whether the cuspids strike in occlusion as they did when the preliminary examination for occlusion was made. If more space is found between the upper and lower cuspids than should be this indicates an error, to correct which, heat the compound on the under side of the denture and repeat the technic to this point. It is sometimes necessary to add a new blank of compound to the under side of the lower and repeat the entire technic.

When the lower is properly seated on the ridge so that the patient can open the mouth and snap the lower teeth quickly against the upper, producing a sharp, clear noise, and when a close examination reveals no defect in the occlusion or articulation such as would be due to seating the lower incorrectly against the upper, the fit may be still further improved by heating the compound with a hot water stream, which should be allowed to touch only the deep portions of the compound made by the ridge, for about eight seconds, then placing the lower in the

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mouth on the ridge, requesting the patient to close with the tongue touching the roof of the mouth, exert biting pressure, and suck.

Chill the compound to a stage in which it will not change its form and remove from the mouth and complete the chilling in cold water.

With a tracing stick make additions to the flanges of the compound in the areas over the location of the projections of vulcanite that were cut away at the beginning of the operation. At these points the single thickness of the compound wafer requires reinforcing to provide enough material to take a correct impression of the tissues. Chill the added compound and proceed as directed in the technic described for the use of the tracing stick on page 149, instructing the patient to suck.

The lower denture should be perfectly stable on the ridge and exhibit marked suction. If it has stability and no suction, press one side against the ridge with the fingers of one hand which are supported by pressure of the thumb on the lower border of the mandible, and gradually lower the other side till seated on the ridge, watching for appearance of bubbles. Repeat this several times and watch closely for the appearance of bubbles which will be formed in the region where air escapes at the point of imperfect adaptation. Correct the adaptation by adding compound from a tracing stick, as described in a previous paragraph. Imperfect adaptation which interferes with suction is most likely to occur at the heels of the denture and at the frenum linguae.

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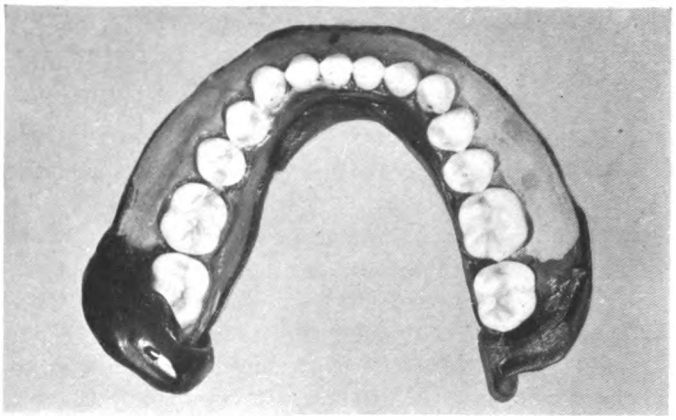

Fig. 216.

Refitting the Lower Denture, Part III.

It frequently happens that the lower denture is not made long enough to secure stability and suction. To correct this condition trace a bulk of soft compound on the upper side of the heel of the denture as shown at the top of the page. Place the denture in the mouth, the upper being in place, and have the patient close and suck. If the surface of this addition is not smooth enough, correct the defects by the use of the tracing stick.

The edges of the compound addition should be trimmed so that the margins of the flanges will be well rounded. The flanges should not be allowed to extend below the external oblique line on the buccal side nor below the mylohyoid line on the lingual side. Place the lower denture against the upper in occlusion and make sure that the compound additions do not strike the upper so as to interfere with lateral motions of the jaw.

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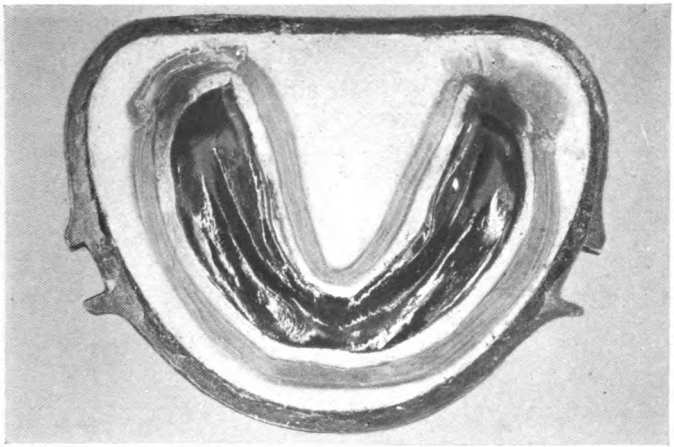

Fig. 217

Refitting the Lower Denture, Part IV.

Scrape away the compound which has been forced upward on the buccal and lingual flanges of the lower. Make a very stiff mixture of equal parts of Spence plaster and plaster of Paris and fill the cup portion of a flask. Work some of this stiff mixture into the interproximal spaces and the occlusal surfaces of the teeth. With gentle rotating pressure force the denture into the plaster in the flask, till the edge of the bucco-labial flange is at the level of the edge of the flask. The denture should be placed well forward in the flask to provide ample room to prepare a flat sloping surface back of the heel to facilitate parting for packing. Smooth the plaster as shown in the illustration and trim it to the point where the compound joins the rubber except at the heel where this is impossible. When the plaster has hardened, coat it with thin sandarac varnish and lay on the plaster a strip of wax as shown, about 1/8 inch away from the compound.

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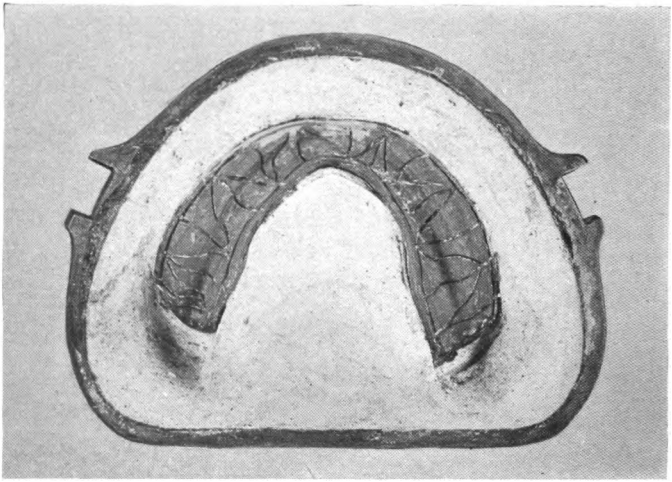

Fig. 218.

Refitting the Lower Denture, Part V.

Seal the ring of the flask firmly and evenly upon the poured cup section. Make a mixture of pure Spence plaster or of half Spence and half plaster of Paris, free it from bubbles as described on page 158 and distribute it over the impression in the manner used in making the casts. Fill the ring to the top and place the lid on it and set a weight on the lid or clamp the flask lightly in a clamp or press. Allow the plaster to set thoroughly and heat the flask before opening for about fifteen minutes in water at about 118° F. If the flask is overheated, the compound will adhere very tenaciously to the rubber.

Refitting the Lower Denture, Part VI.

The rubber which replaces the compound should be thick enough to vulcanize properly but only as much thicker than this as conditions make absolutely necessary. At the places where the compound was very thin cut away enough vulcanite with an oval vulcanite bur to provide

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space for a bulk of rubber one-half mm. thick. With the same bur freshen the entire surface of exposed vulcanite. The edges of the flanges may be squared with a carborundum stone. Cut grooves with a wheel bur as shown in the illustration, one of which extends entirely around the periphery of the denture about 1/16 of an inch away from the edge, the others diagonally across the surface of it.

Warm the flask slowly over an electric heater or a slow gas flame till the vulcanite is hot enough to be uncomfortable to touch, then lay on it a series of strips of rubber about one-quarter inch wide, till the surface is covered. It is better to have a surplus of rubber than not enough to insure the forcing of the softened rubber into the grooves when the test closure is made. Coat the cast and the adjacent plaster of the reverse half of the flask with Silex, allow to stand for a minute, then wash away the surplus Silex under the water faucet. Place percaline between the sections of the flask and put them together in a flask-press, exerting very slight sustained pressure so as to follow the rubber as it flows. When further closing with very light pressure is impossible, open the flask and cut away the surplus rubber which has flowed over the retaining wall, replace the percaline and close the flask till resistance to pressure is felt. Boil the flask for fifteen minutes or more and apply closing pressure to the press. Much better results are obtained by using sufficient heat and opening the flasks three or four times, if necessary, to remove surplus rubber than by attempting to force insufficiently heated rubber to flow. When the metal edges of the flask sections come together, remove the percaline and surplus rubber, place in a Donham clamp and vulcanize, holding the temperature at 270° F. three-quarters of an hour, then raise it to 320° F. and hold here for fifty-five minutes.

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Fitting the Dentures to the Mouth and Perfecting the Articulation.

When the upper and lower dentures are in place in the mouth, the occlusal surfaces of the teeth should permit of easy, free lateral and protrusive movements of the mandible. A slight unavoidable shifting of the teeth occurs in vulcanizing and this interferes with the occlusal surfaces of the two sets gliding as freely on one another in the mouth as they did in the articulator. It has commonly been supposed that grinding in the articulator would accomplish the change necessary to establish accurate smooth working of the teeth in mastication. While this is true to a degree it must be remembered that there is always present in natural dentures a certain freedom or latitude of movement which permits the teeth to slide freely without engaging accurately in a definite restricted way.

This latitude of movement is due to a very slight yielding of the inter-articular tissues of the temporo mandibular articulation and also to some extent to a yielding of individual teeth in their sockets and to a variation in muscular tension which cannot be duplicated in a metal articulator.

It seems natural to suppose that the most rational place to secure the final adjustment of the dentures to each other would be in the mouth. Following this plan the latitude of movement peculiar to the patient may be used to produce a free movement in the articulation of the dentures, which will permit the patient to use the habitual movements in masticating with comfort and efficiency.

While grinding the teeth in the mouth the dentures are supported on their respective ridges and the patient directed to work the jaw in lateral and protrusive movements with a suitable abrasive between the occlusal surfaces of the teeth.

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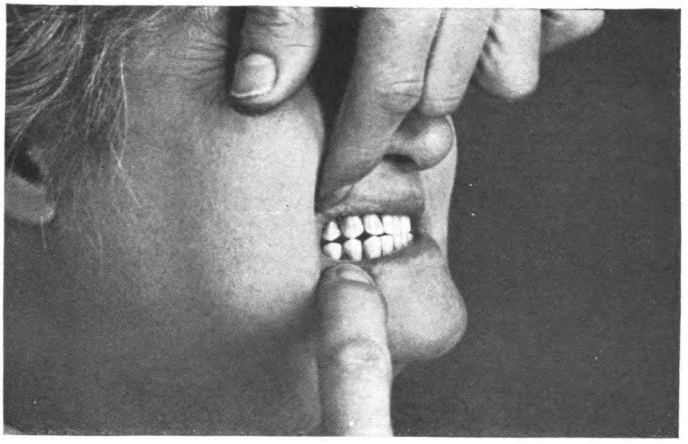

Fig. 219.

Fitting the Dentures to the Mouth and Perfecting the Articulation—Cont.

Before commencing to grind the teeth in the mouth, correct visible errors in articulation by grinding, where necessary, with a carborundum stone, observing the following points:

When the lower is protruded, so that the median line above is directly over the median line below and the incisors hit end on, the dentures should be balanced on the centrals in front; the upper cuspid should touch the lower first bicuspid; the second upper bicuspids should rest on the lower first molars or the mesial cusps of the upper first molar should rest on the lower first molars to balance and support the dentures in the rear. Other supports may exist but no heavy pressure should be permitted to come on the lower second molar. The mesial cusp of the lower cuspid should not touch the upper lateral in this or any other relation of the dentures.

When it is necessary to shorten the lower incisors to let the upper cuspids touch the lower first bicuspids, grind away the lingual surfaces and not the labial. The tips of

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Fig. 220.

Fitting the Dentures to the Mouth and Perfecting the Articulation—Cont.

the cusps of other interfering teeth may also be ground where necessary to establish proper supporting contacts without decreasing danger of the efficiency of the dentures.

Try the dentures in right and left lateral articulation and correct the contacts of any teeth that prevent proper relations of adjoining teeth in both the working and balancing bite for both sides of the denture.

When this has been accomplished mix one part of a cocoa butter such as is sold for coating synthetic fillings, with about four parts by volume of Copper Carbo powder. The mixing can be best done on a glass slab with a hot cement spatula. Dry the teeth of both dentures and smear the lingual surfaces of the upper incisors and the occlusal surfaces of the lower posteriors with the abrasive mixture. Place the dentures on the ridges and hold them there, while the patient moves the lower from right to left, keeping it in the retruded position.

At first it will be noted that the lateral movement tends

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Fig. 221.

Fitting the Dentures to the Mouth and Perfecting the Articulation—Cont.

to cause the dentures to rotate; however, this tendency decreases as the grinding progresses.

It is not sufficient to let the patient chew the abrasive. The dentures must be firmly supported on their ridges till all tendency to rotate disappears.

Follow the grinding from side to side with grinding for the front to back movements of the jaw.

Allowing for occasional short rests for the patient if aged, this operation should consume from twenty minutes to one-half hour. It is of course impossible to use this method effectively on plain line dentures or teeth that are not anatomically correct in design—as the amount of grinding necessary under these conditions will render impossible anything like fair results.

The grinding should be continued only until the dentures work smoothly.

Smooth off sharp edges on the incisal of the anteriors with sandpaper disks, treat the cusp edges in the same manner and the operation is complete.

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Fig. 222.

Finis

The technic described in the foregoing pages produces artificial dentures which are natural in appearance, comfortable in use, stable in all positions of the jaw and efficient in mastication.

Such denture service, and only such denture service when it can be rendered, discharges the obligations which are placed upon us by our professional position, by the dependence of edentulous patients upon our knowledge and skill, by the economic worth of many edentulous persons and by their right to life, health and the pursuit of happiness.

For this reason we have called service of this quality

PROFESSIONAL DENTURE SERVICE.

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INDEX

PART I

IMPRESSIONS AND BITES

PAGE

Attaching the Impression Compound 31
Attaching the Lower Bite Rim 62
Attaching the Upper Bite Rim—Part I 44
Attaching the Upper Bite Rim—Part II 45
Attaching the Upper Bite Rim—Part III 46
Carrying the Bite Rimmed Lower Tray Into the Mouth 63
Carrying the Compound Flanges High 39, 40
Chilling the Compound Next to Tray 33
Chilling the Right-hand Marginal Flange 35
Classification of Tissue Conditions in Edentulous Mouths 16-19
Completing the Upper Bite Rim 54
Compound-Plaster Impressions 95
Correcting Errors in Bite Rim Depth—Part I 52
Correcting Errors in Bite Rim Depth—Part II 53
Determining Length of Tray 21
Establishing the Plane of Occlusion—Part I 48
Establishing the Plane of Occlusion—Part II 49
Equalizing Surface Temperature of Compound 36
Forming the Lower Bite Rim 61
Guide Rimming the Lower Tray 57
Heater for Impression Compound 23
Heating the Upper Buccal Flange for Muscle Trimming 79
Heights of the Bite Rims 89-91
Impression Marked for Relief 86
Inserting the Lower Tray 58
Inserting the Tray for the Lower Impression 67
Introducing Compound for Upper Impression—Part I 37
Introducing Compound for Upper Impression—Part II 38
Locating Compressible Palatal Tissues 20
Lower Trays 55
Merits of Compound Impressions 14
Muscle Trimming the Lower Lingual Flange—Part I 74
Muscle Trimming the Lower Lingual Flange—Part II 75
Muscle Trimming the Labial Flange of the Upper Impression—Part I 81
Muscle Trimming the Labial Flange of the Upper Impression—Part II 82
Muscle Trimming the Upper Buccal Flanges 80
Outlining Areas for Compression and Relief 83
Perfecting Adaptation of the Upper Flange to the Ridge 88
Perfecting the Fit of the Tray—Part I 24
Perfecting the Fit of the Tray—Part II 25
Perfecting the Fit of the Tray—Part III 26, 27
Placing the Bite Rimmed Lower Tray 64
Plaster Upper Compound Lower 96
Preparing the Upper Tray for the Attachment of the Compound 28
Preparing the Upper Tray for the Attachment of the Bite Rim 29
Relief Over the Course of the Palatine Artery 84
Restoring Facial Expression—Part I 92
Restoring Facial Expression—Part II 93
Restoring Facial Expression—Part III 94
Seating the Lower Tray 59, 60
Shaping the Compound for the Lower Impression 66
Shaping the Compound in the Tray 32
Shaping the Lower Tray 56

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IMPRESSIONS AND BITES—Continued

PAGE

Softening Palatal Surface of Compound....34
Stabilizing the Lower Impression....78
Technic for Heating Flange for Muscle Trimming....71
Test for Quantity....30
The Plane of Occlusion—Front View....50
The Plane of Occlusion—Side View....51
The Incomplete Lower Impression....69
The Relation of the Lower to the Ridge....77
Transferring Markings to Impression....85
Trimming the Buccal Flange....76
Trimming the Impression for Length....42, 43
Trimming the Lower Bite Rim....65
Trimming the Lower Buccal Flange....73
Trimming Lower Labial Flange—Cuspid to Cuspid....72
Trimming the Surplus from the Lower Impression....70
Trimming the Surplus from Upper Impression....41
Trimming the Upper Impression at the Frenum....87
Trimming Upper Impression Trays....22
Turning Up the Surplus Compound on Buccal and Labial Surfaces....68
What the Occlusal Plane Is....47

PART II

SELECTING THE SIZE, FORM AND SHADE IN ARTIFICIAL TEETH

Determining the Type of Face....113
Dimensions Trubyte Moulds—Uppers....114
Dimensions Trubyte Moulds—Lowers....115
Harmony of Form in Faces and Teeth....102-105
Locating the Distal Sides of the Cuspids....99
Marking the Median Line....98
Measuring for Width of Upper Anteriors....101
Shading in Artificial Teeth....119
Suggestions for the Selection of Shades....121
Surface Texture and Tooth Shades....123
Table of Colors in the Twentieth Century Shade Guide....122
Trubyte Selection Rim....118
Trubyte Teeth—Mould Guide....116
Typal Forms in Natural Teeth....112
Typal Ovoid Face....110
Typal Square Faces....106
Typal Tapering Faces....108
Use of a Mould Guide....117

PART III

MEASURING HABITUAL MASTICATING MOVEMENTS

Adapting Baseplate....175-177
Adjusting the Condyle Path Register and Removal....148
Adjusting the Horizontal Pencils....134
Adjusting the Vertical Pencils....143
Attaching the Horseshoe Plate to the Bite Rim....132
Attaching the Incisor Path Marker to the Impression....137
Blackening the Horseshoe Plate....138
Building the Lower Bite Rim Forward....180
Condyle Path Register and Accessories....127

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MEASURING HABITUAL MASTICATING MOVEMENTS—Continued

PAGE
Correct and Incorrect Descending Inclination Record 136
Correct and Incorrect Incisor Path Records 140
Correct and Incorrect Lateral Paths 147
Correcting Lack of Fit in the Impressions 149, 150
Determining the Depth of Relief 153
Drawing Base Lines for the Lateral Inclination Records 142
Equalizing Biting Strain on the Bite Rims 133
Holding the Lateral Path Register—Part I 144
Holding the Lateral Path Register—Part II 145
Interferences that Prevent Correct Records 126
Locating the Heads of the Condyles 129
Locating the Horseshoe Plate 130
Locating the Rotation Points—Part I 171
Locating the Rotation Points—Part II 172
Locking the Bites 152
Locking the Bite Rims for Mounting 165
Making Casts—Part I 159
Making Casts—Part II 160
Marking Lines on the Upper Cast 173
Mixing the Material for Casts 158
Mounting Casts on the Adaptable Articulator 167-170
Preparing the Bite for Locking 151
Preparing the Impressions for Making Casts—Part I 155
Preparing the Impressions for Making Casts—Part II 156
Protecting the Bite Rims and Records During Casting.....157
Recording the Lateral Inclination 146
Re-Forming the Lower Bite Rim 178
Re-Forming the Upper Bite Rim 181
Registering the Descending Inclination of the Condyle Path....135
Relieving the Impression 154
Removing the Lower Impression from the Cast 174
Removing and Replacing the Upper Part of the Adaptable and Simplex Articulators 182
Reproducing the Descending Inclination of the Condyle Path—Part I 161
Reproducing the Descending Inclination of the Condyle Path—Part II 162
Reproducing the Lateral Inclination of the Condyle Path—Part I 163
Reproducing the Lateral Inclination of the Condyle Path—Part II 164
Taking the Incisor Path Record 139
Trimming and Marking the Lower Bite Rim 179
Why It Is Worth While to Reproduce Jaw Movements.....125
Withdrawing the Condyle Path Register 131

PART IV

ARRANGING THE TEETH

Arranging the Teeth 184
Arranging the Upper Anteriors 185-188
Arranging the Upper Posteriors 189-192
Arranging the Teeth—The Lower First Molar 196-199
Arranging the Teeth—The Bicuspids 200-202
Arranging the Teeth—The Cuspids.....203-204
Arranging the Teeth—The Incising Bite 205-206
Arranging the Teeth—The Lower Second Molars 209, 210
How to Move the Articulator Properly 195
Inspecting the Trial Dentures in the Mouth 207, 208
Working and Balancing Molar Contacts 194

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PART V

Simplex Articulator and Snow Face Bow

PAGE
Adjusting the Face Bow to the Face—Part I 215
Adjusting the Face Bow to the Face—Part II 216
Adjusting the Face Bow to the Face—Part III 218
Attaching the Horseshoe Plate 214
Building Separate Bite Plates 212
Face Bow Technic for Large Cases 224
Mounting Casts on the Simplex Articulator with a Face Bow—Part I 220
Mounting Casts on the Simplex Articulator with a Face Bow—Part II 221
Mounting Casts on the Simplex Articulator without the Face Bow 222, 223
Removing the Face Bow 219
Simplex Articulator and Accessories 212
Taking the Incisor Path Record 217

PART VI

Flasking, Vulcanizing, Finishing and Perfecting the Fit

Fitting the Dentures to the Mouth and Perfecting the Articulation 248-251
Flasking the Dentures—Part I 228
Flasking the Dentures—Part II 229
Finis 252
Packing and Testing—Part I 231
Packing and Testing—Part II 232
Packing and Testing—Part III 233
Polishing 237
Preparation of Channel for Waste Rubber 230
Preparing Dentures for Polishing—Part I 235
Preparing Dentures for Polishing—Part II 236
Preparation of Trial Dentures for Flasking—Part I 226
Preparation of Trial Dentures for Flasking—Part II 227
Refitting the Lower Denture—Part I 239
Refitting the Lower Denture—Part II 241-243
Refitting the Lower Denture—Part III 244
Refitting the Lower Denture—Part IV 245
Refitting the Lower Denture—Part V 246
Refitting the Lower Denture—Part VI 247
Testing Occlusion for Rocking 238
Vulcanizing and Opening the Flasks 234

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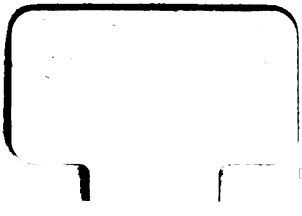
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